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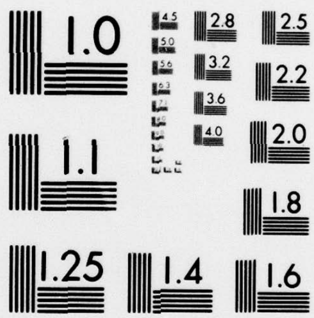

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OSWEGO RIVER BASIN

DE RUYTER DAM

ONONDAGA COUNTY
NEW YORK

INVENTORY No NY 774

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

CONTRACT NO. DACW-51-79-C0001

NEW YORK DISTRICT CORPS OF ENGINEERS

JULY 1979

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Phase I Inspection Report De Ruyter Dam Oswego River Basin, Onondaga County, New York Inventory No. 774		5. TYPE OF REPORT & PERIOD COVERED Phase I Inspection Report National Dam Safety Program
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) 10 John B. Stetson, P.E.	15	8. CONTRACT OR GRANT NUMBER(s) DACW51-79-C-0001
9. PERFORMING ORGANIZATION NAME AND ADDRESS Stetson - Dale Engineering Company Bankers Trust Building Utica, New York 13501		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS New York State Department of Environmental Conservation/ 50 Wolf Road Albany, New York 12233	11	12. REPORT DATE 28 Sept[redacted]1979
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) Department of the Army 26 Federal Plaza/ New York District, CofE New York, New York 10007		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; Distribution unlimited. 12 93

LEVEL II

17. ... 20, if different from Report)

6 National Dam Safety Program. De Ruyter Dam (Inventory Number NY 774), Oswego River Basin, Onondaga County, New York. Phase I Inspection Report,

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety	
National Dam Safety Program	De Ruyter Dam
Visual Inspection	Onondaga County
Hydrology, Structural Stability	De Ruyter

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization.

The DeRuyter Dam is an earthen dam, 68 feet in height, which is used as a flow augmentation reservoir for the New York State Barge Canal. The visual inspection and screening analyis revealed deficiencies which require investigations and remedial measures.

CONT

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The drainage area into DeRuyter Lake is 5.62 square miles. Computations using the Corps of Engineers' screening criteria, establishes the spillway capacity as 821 cfs. This is 17 percent of the PMF. The PMF and 1/2 PMF discharges are 4,741 and 496 cfs, respectively. Approximately 73 percent of the total PMF runoff can be held in surcharge storage between the spillway crest and top of dam. The spillway has been determined inadequate to pass the PMF. However, the spillway is not considered seriously inadequate, based on the Corps of Engineers' Screening Criteria, since the dam is capable of passing the 1/2 PMF without the dam being overtopped.

Rising waters flooding residences around the lake could pick up floatable debris which would clog the stone arch spillway culvert structure causing the dam to be overtopped. Complete clogging of the high level spillway could cause the dam to be overtopped by 2-3 feet.

The following investigations and remedial measures should be performed within one year:

1. Necessary repairs should be made to the existing underdrain system to utilize the available protection against the seepage conditions which are known to occur. Areas of surfacing seepage should be cleared of heavy vegetation and kept under observation. It should be anticipated that seepage zones persisting after the present underdrain collection system is fully operating could require an extension of the present system to also handle new areas.
2. Backfill the open excavation at the toe of the dam near the center of the embankment.
3. Brush on the downstream side should be removed to permit easier access to all areas and permit better observation/detection of seeping areas or other conditions requiring attention. Trees on the embankment should be removed to eliminate damage from storm-caused uprooting.
4. After clearing the embankment, the areas where seepage is suspected should be inspected.
5. Develop an emergency action plan so that proper equipment to remove large floatable debris which may clog in the spillway culvert is made available in event of serious flooding. A notification system should be provided for use during emergencies.
6. The riprap should be repaired to prevent progressive deterioration. Corrections include replacing missing stone and stabilizing the zones where embankment erosion has caused the riprap to slough.
7. The spillway and outlet channel should be repaired to prevent progressive damage. Damaged and deteriorated areas of the outlet channel should be rehabilitated. A maintenance program should include periodic removal of heavy debris from the channel.
8. Repair or replace low level outlet valves. Since the spillway is small, the outlet capacity is important for flood water discharging in the case of a serious flood event.
9. Provide a program of periodic inspection and maintenance of the dam and appurtenances, including yearly operation and lubrication of the reservoir drain system. Document this information for future reference:

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FIGURES

APPENDICES

Overview of DeRuyter earth embankment dam located in South-east Onondaga County, New York.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam DeRuyter Dam, NY774

State Located New York
County Located Onondaga
Stream Limestone Creek
Date of Inspection June 13, 1979

ASSESSMENT OF GENERAL CONDITIONS

The DeRuyter Dam is an earthen dam, 68 feet in height, which is used as a flow augmentation reservoir for the New York State Barge Canal. The visual inspection and screening analyis revealed deficiencies which require investigations and remedial measures.

The drainage area into DeRuyter Lake is 5.62 square miles. Computations using the Corps of Engineers' screening criteria, establishes the spillway capacity as 821 cfs. This is 17 percent of the PMF. The PMF and 1/2 PMF discharges are 4,741 and 496 cfs, respectively. Approximately 73 percent of the total PMF runoff can be held in surcharge storage between the spillway crest and top of dam. The spillway has been determined inadequate to pass the PMF. However, the spillway is not considered seriously inadequate, based on the Corps of Engineers' Screening Criteria, since the dam is capable of passing the 1/2 PMF without the dam being overtopped.

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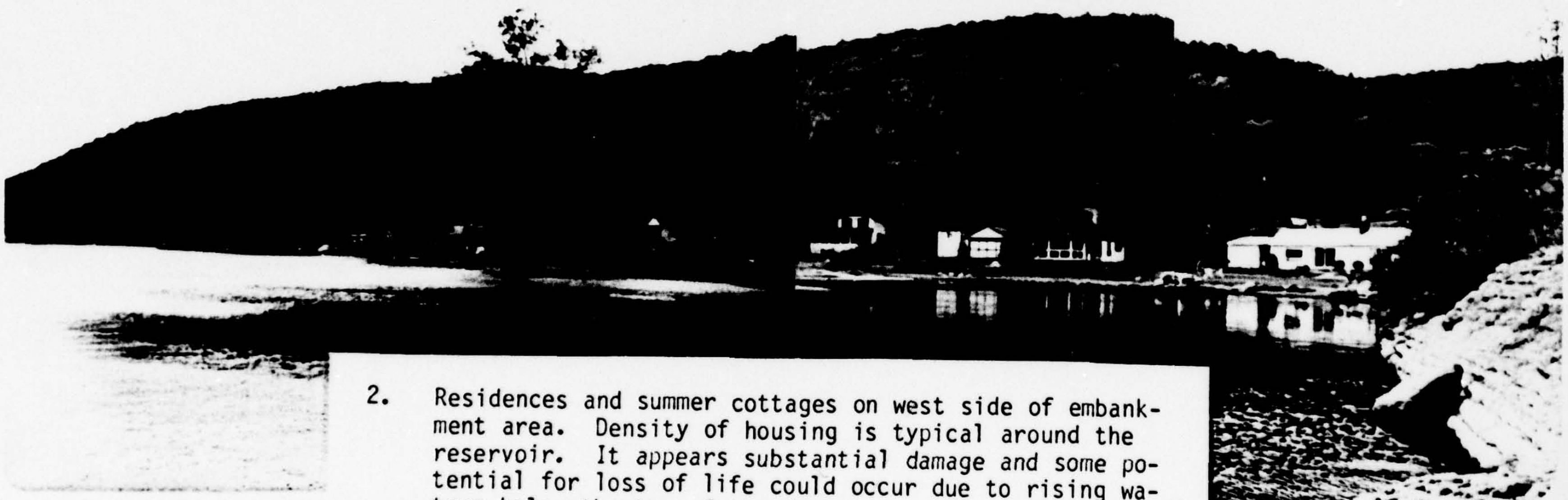
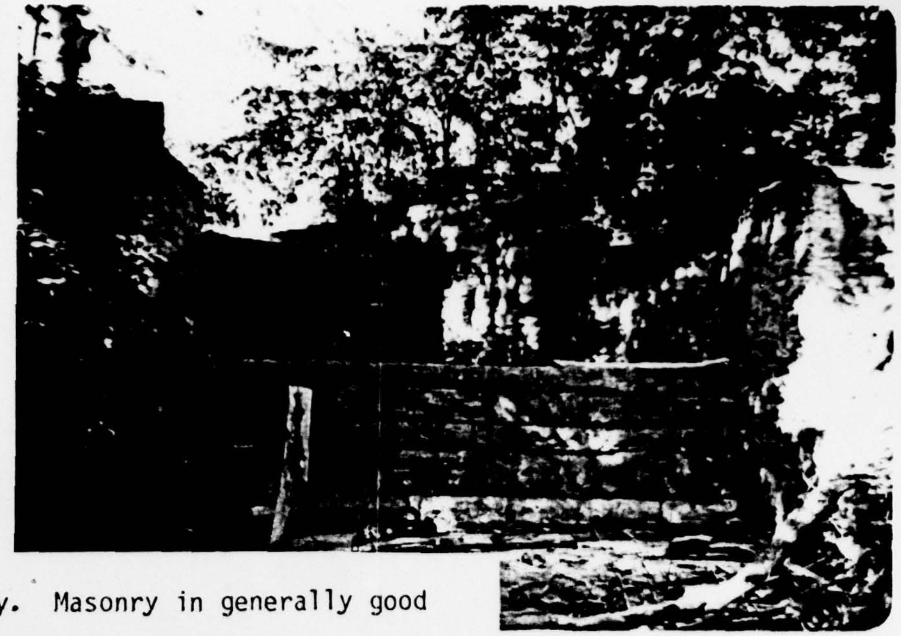
1. View across face of dam looking west in opposite direction from overview picture. This area was cleared in the previous year. Grasses are growth through riprap material.



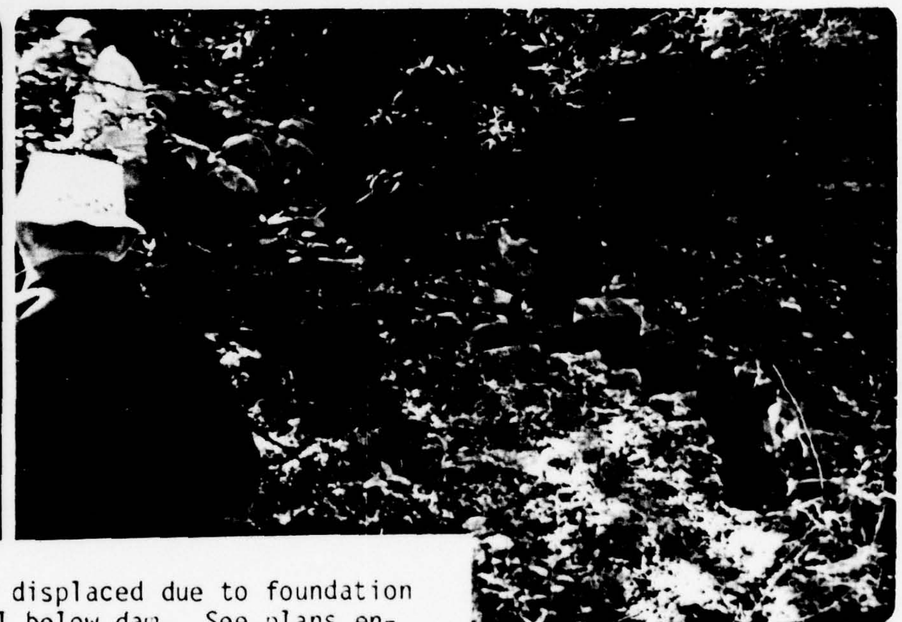
2. Residences and summer cottages on west side of embankment area. Density of housing is typical around the reservoir. It appears substantial damage and some potential for loss of life could occur due to rising waters below the top of the dam.

3. Masonry spillway weir. Some separation of stone masonry.

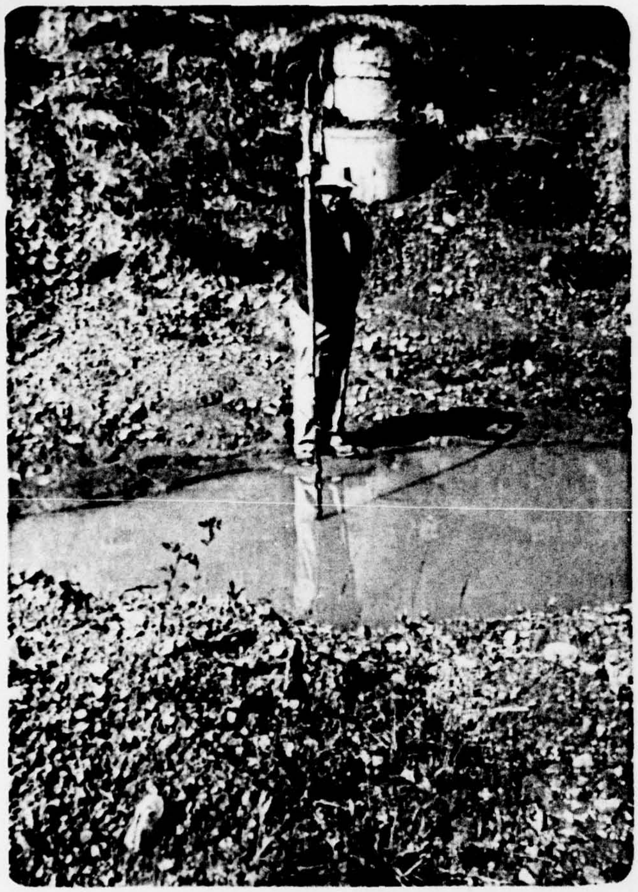
4. Upstream and downstream view of spillway culvert below road across top of dam.



5. Views looking up spillway. Masonry in generally good condition.



6. Bottom of spillway channel displaced due to foundation failure. This area is well below dam. See plans enclosed in report.

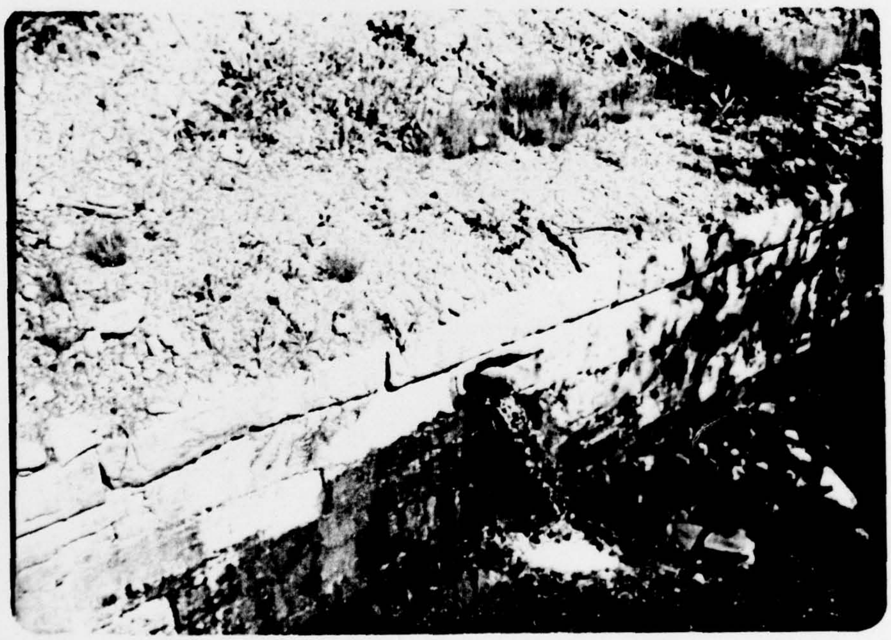


7. Area in deep section of embankment where drainage system was repaired and needs to be regraded.

8. Wet area along drainage ditch at toe of embankment on west portion of dam.

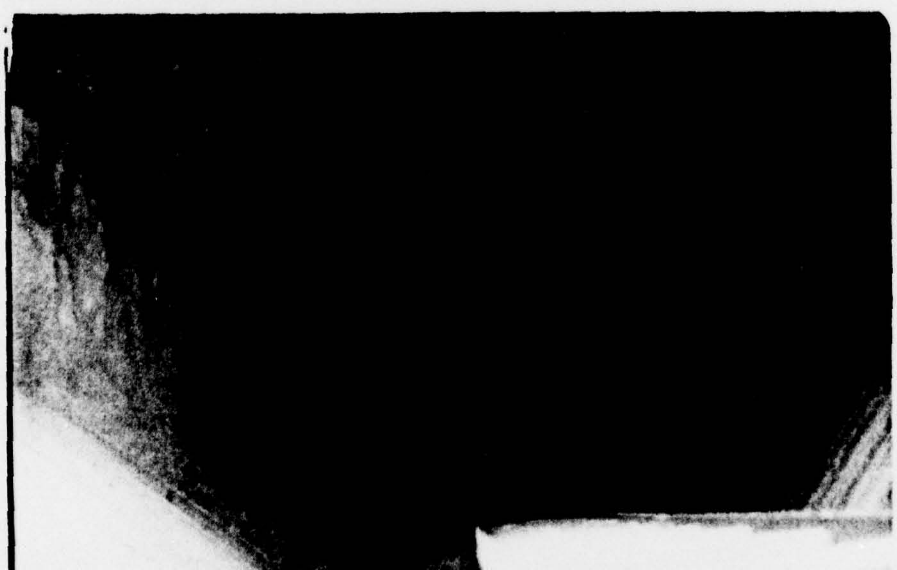
9. View of trees growing near top of embankment. At deepest section, embankment is very wide.

10. Drain outlet for east side of dam where it discharges into main channel.



11. Substantial flow from west side of dam drainage system.

12. Regulated outflow below dam controlled from gates contained in silo seen above.



13. View of three gates in bottom of silo pit. One gate is out of operation, another leaks badly, the third operates. All three have advanced corrosion. The ladder into the pit is corroded.

2. Backfill the open excavation at the toe of the dam near the center of the embankment.

3. Brush on the downstream side should be removed to permit easier access to all areas and permit better observation/detection of seeping areas or other conditions requiring attention. Trees on the embankment should be removed to eliminate damage from storm-caused uprooting.

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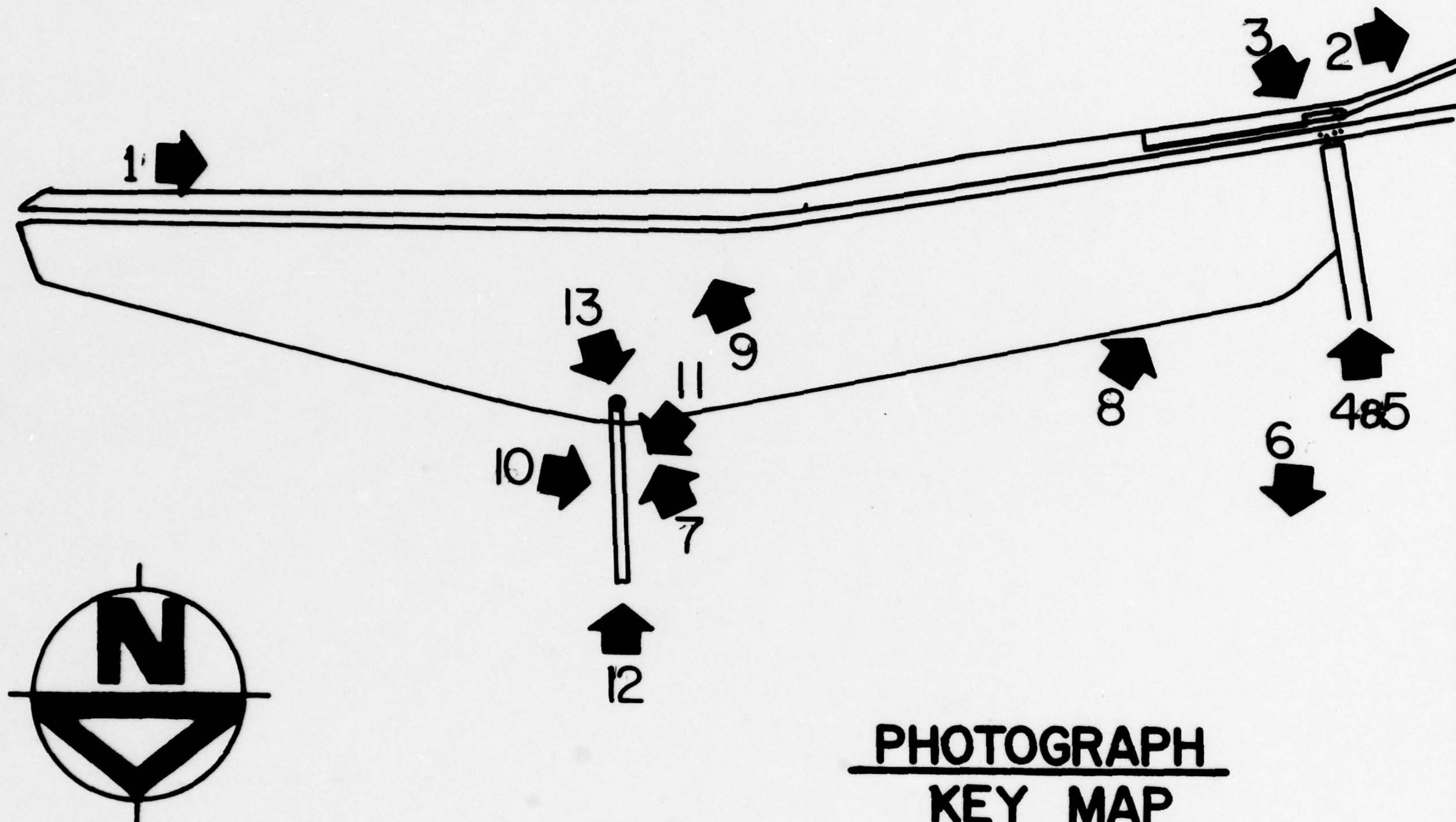
Dale Engineering Company

John B. Stetson, President

Approved By:
Date: 28 Sept 79

Col. Clark H. Benn
New York District Engineer

DE RUYTER DAM



PHOTOGRAPH KEY MAP

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NAME OF DAM - DERUYTER DAM ID# NY 774

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

Authority for this report is provided by the National Dam Inspection Act, Public Law 92-367 of 1972. It has been prepared in accordance with a contract for professional services between Dale Engineering Company and the New York State Department of Environmental Conservation.

b. Purpose of Inspection

The purpose of this inspection is to evaluate the existing condition of the DeRuyter Dam and appurtenant structures, owned by the New York State Department of Transportation, and to determine if the dam constitutes a hazard to human life or property and to transmit findings to the State of New York.

This Phase I inspection report does not relieve an Owner or Operator of a dam of the legal duties, obligations or liabilities associated with the ownership or operation of the dam. In addition, due to the limited scope of services for these Phase I investigations, the investigators had to rely upon the data furnished to them. Therefore, this investigation is limited to visual inspection, review of data prepared by others, and simplified hydrologic, hydraulic and structural stability evaluations where appropriate. The investigators do not assume responsibility for defects or deficiencies in the dam or in the data provided.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam and Appurtences

The DeRuyter Dam is an earth fill dam approximately 1600 feet long with a height of 68 feet. The side slope of the upstream face of the dam is approximately 2 horizontal on 1 vertical. The downstream face of the dam embankment is at 3 horizontal, 1 vertical, while the toe of the dam on the downstream side is 4 horizontal and 1 vertical. The upstream face of the dam is riprapped at the water line to the top of the dam. A paved rural road traverses the entire length of the dam providing access to the many cottages surrounding the lake. No information was discovered regarding the composition of the fill. Subdrain lines have been installed on the downstream slope of the dam during the years 1947, 1950, and 1951. These lines were installed to control seepage in the downstream face.

The service spillway consists of a 40 foot wide, sharp crested weir, which discharges through a masonry arch culvert. This culvert is 5 feet 8 inches high with a span of 11 feet 10 inches. This culvert discharges through a masonry channel which extends a distance of approximately 385 feet down to the receiving stream.

The dam is also equipped with a control outlet. This outlet consists of three 12 inch pipes which are controlled by gate valves situated in a pit near the toe of the embankment. These valves are manipulated to control the discharge into Limestone Creek, which flows into the Barge Canal.

A feeder canal has been constructed for a distance of approximately one mile from the south end of the DeRuyter Reservoir. Flow in this feeder is controlled by a series of sluice gates located just above a small dam on the Middle Branch of the Tioughnioga River. Utilization of this structure allows flow from the Tioughnioga to be diverted into Deruyter during the spring runoff.

b. Location

The DeRuyter Dam is located in the Town of Fabius in Onondaga County, and in the Town of Cazenovia in Madison County, New York.

c. Size Classification

The maximum height of the dam is approximately 68 feet. The storage volume in the impoundment is approximately 12,000 acre-feet. Therefore, the dam is in the intermediate size classification as defined by The Recommended Guidelines for Safety Inspection of Dams.

d. Hazard Classification

There are a significant number of residential properties located along Limestone Creek, the receiving stream from the DeRuyter Dam. Therefore, the dam is in the high hazard category as defined by The Recommended Guidelines for Safety Inspection of Dams.

e. Ownership

The dam is owned by the New York State Department of Transportation.

Waterway Maintenance Subdivision:	Region Three:
New York State - DOT Main Office - State Campus 1220 Washington Avenue Albany, New York 12232 Director - Mr. Joseph Stellato (518) 457-4420	New York State - DOT Syracuse State Office 333 E. Washington Street Syracuse, New York 13202 Engineer - Mr. Leo Burns (315) 473-8194

f. Purpose of Dam

The dam is used to regulate flow in Limestone Creek for flow augmentation in the Barge Canal system. The impoundment of the DeRuyter Dam is also used for recreational purposes.

g. Design and Construction History

The DeRuyter Reservoir was placed in operation in 1862, just prior to its completion in 1863. In 1868, improvements were authorized in the DeRuyter Reservoir although the extent of these improvements is not known. In 1897, funds were allocated for the improvement of the riprap slope in the DeRuyter Reservoir and for improvements in the feeder stream. In 1947, 1950, and 1951, subdrains were installed on the downstream slope of the dam embankment to control seepage.

h. Normal Operational Procedures

The main purpose of this facility is for flow augmentation in the Barge Canal. Flows from the reservoir are regulated by manipulating the 12 inch valves in the drain line at the toe of the dam. This flow is conducted to Limestone Creek, which in turn flows into the Barge Canal. The diversion structure on the middle branch of the Tioughnioga River allows flow to be diverted from the Tioughnioga River watershed into the DeRuyter Reservoir during the spring run-off. This allows the level of the impoundment to be peaked off before the dry summer periods.

1.3 PERTINENT DATA

a. Drainage Area

The drainage area of DeRuyter Dam is 5.62 square miles.

b. Discharge at Dam Site

No discharge records are available for this site.

Computed Discharges:

Ungated Spillway, Top of Dam	769	cfs
Ungated Spillway, PMF	4141	cfs
1/2 PMF	496	cfs
Gated Drawdown	52	cfs

c. Elevation (Feet Above MSL)

Top of Dam	1287
Maximum Pool - PMF	1288.7
1/2 PMF	1284.6
Spillway Crest	1280
Stream Bed at Centerline of Dam	1219

d. Reservoir

Length of Maximum Pool	10,000 ft
Length of Normal Pool	10,000 ft

e. Storage

Top of Dam	16,200 Acre Feet
Design Surcharge (1/2 PMF)	16,300 Acre Feet
Normal Pool	11,890 Acre Feet

f. Reservoir Area

Top of Dam	560 Acres
Maximum Pool	560 Acres
Spillway Pool	560 Acres

g. Dam

Type - Earth fill
Length - 1600 feet
Height - 68 feet
Freeboard Between Normal Reservoir and Top of Dam - 7.7 feet
Top Width - 22 feet
Side Slopes - Upstream: 2 horizontal, 1 vertical
Downstream: 3 horizontal, 1 vertical
4 horizontal, 1 vertical
Zoning - Unknown
Impervious Core - Unknown
Grout Curtain - Unknown

h. Spillway

Type - Sharp crested weir
Length - 40 feet
Crest Elevation - 1280 feet
Gates - None
U/S Channel - Impoundment
D/S Channel - Masonry

i. Regulating Outlets

Three, 12 inch, valved pipes

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The information available for evaluation of this dam has been included in this report. The information consisting of contract drawings is contained in Figures 2 through 5. No information on design of the dam was available.

2.2 CONSTRUCTION

No details of the construction were found during the investigation of the DuRuyter Reservoir.

2.3 OPERATION

No operating manual is known to exist for this structure.

2.4 EVALUATION

The information included in this report is adequate to complete this Phase I investigation. Additional data is not required to complete this Phase I investigation.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The DeRuyter Dam was inspected on June 13, 1979. The Dale Engineering Company inspection team was accompanied on the inspection by Richard Aldrich, of the New York State Department of Transportation, Region 3.

b. Dam

The dam as observed in the field conforms closely to the plans included in this report. The upstream face of the dam is riprapped from the top of the slope to a point well below the water's edge. This riprap is generally in good condition. The riprap in the area round the outlet weir has been grouted. The riprap near the east abutment of the dam is of a different material than the majority of the riprap, and appears to have been repaired. One area of the riprap near the center of the dam shows some evidence of sloughing due to displacement of the bedding material.

The rural highway which traverses the top of the dam is paved with bituminous material. It is difficult to determine the location of the ends of the dam structure because of the development that has taken place in the area of the dam and the heavily overgrown side slopes on the downstream face. In general, the upper reaches of the downstream face are heavily overgrown with trees and brush. This makes detailed inspection of the entire area impractical. The lower slopes of the dam are relatively free of tree growth and brush. The toe of the dam embankment to the west of the controlled outlet terminates at a drainage ditch which runs roughly parallel to the alignment of the dam. Although no surface flow was detected in this ditch, the bottom of the ditch was saturated with water and was easily penetrated by a stick to a depth of approximately 2-1/2 feet. The inspection took place during a relatively dry period, and surface runoff would not be expected at the time of the inspection.

Many of the manholes on the subdrains in the downstream face of the dam were inspected to determine the quantity of flow. In each case, only small amounts of flow were detected in the subdrains. The outlet from the subdrain system discharges into the stream just below the regulating gate structure. Flows from one of the lines from the westerly slope of the dam was flowing a substantial amount of water. The drain lines on the eastern portion were flowing to a lesser amount. However, the flow was clear and there was no evidence of soil material in the discharge.

An excavation on the subdrain system was made during 1978 to repair blockage in the subdrain line. As the excavation progressed, the banks became unstable. The work was abandoned and the excavation was

was left without backfilling. The bottom of this excavation is saturated and unstable. A stick was thrust approximately 3 feet into the bottom of the ditch with little resistance. (See Photograph No. 7.)

c. Spillway

The main spillway located near the west abutment of the dam is in generally good condition. There is some deterioration in the masonry joints, but this is of minor concern. The arch culvert, which receives the flow from the spillway, is in good condition as is the masonry channel downstream from the culvert. The extreme northerly end of the masonry channel is severely deteriorated and undermined. This deterioration will progress up the channel if repairs are not made.

d. Appurtenance Structures

The control structure at the end of the 12 inch drain lines was inspected and found to be in generally good condition. However, the valves on the drain line are badly deteriorated. One valve is at present, inoperative; one valve can be opened only partially; while the third valve is presently in operating condition.

e. Reservoir Area

The reservoir area extends approximately 2 miles upstream from the dam. The shores of the lake are nearly fully developed with summer cottages. There are no known areas of bank instability in the area.

f. Downstream Channel

The downstream channel is in generally good condition. No evidence of recent erosion was noted, except at the toe of the spillway channel, where undermining has occurred.

g. Feeder Canal

The feeder canal was not in operation at the time of the inspection. The channel is cut at a flat grade which allows standing water to occur in the invert. The gates controlling the flow to the canal were in operating condition but were closed at the time of the inspection.

3.2 EVALUATION

The visual inspection reveals some seepage may be occurring along the toe of the westerly downstream slope of the dam. The unfilled excavation on the subdrain system presents a potential problem of slope instability. The undermined end of the spillway channel could cause further deterioration of this channel. No deformation of the alignment of the structure was noted in the visual inspection. The control valves, which regulate flow into Limestone Creek are severely deteriorated and partially inoperative.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The principal function of DeRuyter Dam is to control discharge into Limestone Creek for flow augmentation in the Barge Canal. The valves controlling the discharge are manually operated to provide adequate flow in the barge canal throughout the navigational season.

4.2 MAINTENANCE OF THE DAM

Maintenance and operation of the dam is controlled by the New York State Department of Transportation. Once every two years a visual inspection is made of the structure by the New York State Department of Transportation inspectors and a report on the condition of the structure is filed in the Department of Transportation Central Office in Albany. Maintenance to the structure is scheduled on a priority basis as a result of the bi-annual inspection.

4.3 MAINTENANCE OF OPERATING FACILITIES

Maintenance of the control valves and of the diversion structure on the Tioughnioga River are under the control of the New York State Department of Transportation.

4.4 DESCRIPTION OF WARNING SYSTEMS

No warning system is in effect at present.

4.5 EVALUATION

The dam and appurtenant structures are inspected at regular intervals. The unfilled excavation at the toe of the westerly embankment slope and the poor condition of the regulating valves indicate that maintenance of the dam has not been adequate. The procedure for inspection and reporting on the dam is marginal, a greater frequency of inspection is encouraged especially on those structures where remedial work is needed.

SECTION 5 - HYDROLOGIC/HYDRAULIC

5.1 DRAINAGE AREA CHARACTERISTICS

The DeRuyter Dam is located in a 5.6 square drainage basin in southeastern Onondaga County. The dam provides flow augmentation to the New York State Barge Canal. A diversion structure regulates flow into the reservoir from the Tioughnioga River Basin. This diversion is active only during spring runoff and is used to increase storage in the DeRuyter reservoir. The DeRuyter Dam discharges into Limestone Creek. The upstream drainage area consists both of steeply sloped terrain and mildly sloped to flat terrain. The reservoir is new and the center of the drainage area and occupies 500 acres.

5.2 ANALYSIS CRITERIA

The purpose of this investigation is to evaluate the dam and spillway with respect to their flood control potential and adequacy. This has been assessed through the evaluation of the Probable Maximum Flood (PMF) for watershed and the subsequent routing of the flood through the reservoir and the dam's spillway system. The PMF event is that hypothetical flow induced by the most critical combination of precipitation, minimum infiltration loss and concentration runoff of a specific location that is considered reasonably possible for a particular drainage area. Since this dam is in the Intermediate Dam Category and is a High Hazard, the guidelines criteria (Ref. 1) require that the dam be capable of passing one-half the Probable Maximum Flood.

The upstream diversion gates were inspected and it was determined that flood flows on the Tioughnoiga River would not affect the DeRuyter flood stages, therefore runoff from that basin was not included in this investigation.

The hydrologic analysis was performed using the unit hydrograph method to develop the flood hydrograph. Due to the limited scope of this Phase I investigation, certain assumptions, based on experience and existing data were used in this analysis and in the determination of the dam's spillway capacity to pass the PMF. In the event that the dam could not pass the 1/2 Probable Maximum Flood without overtopping, an additional analysis are to be performed on potential dam failure if the dam designated as a High Hazard Classification. This process was done with the concept, that if the dam was unable to satisfy this criteria, futher refined hydrologic investigaitons would be required.

The U.S. Army Corps of Engineers, Hydrologic Engineering Center's Computer Program HEC-1 DB using the Modified Puls Method of flood routing was used to evaluate the dam, spillway capacity, and downstream hazard.

Unit hydrographs were defined by Clark coefficients, Tc and R derived from a previous study (See Appendix C, page C-1 and C-2). The derived value of R/(Tc+R) was .37 while Snyder coefficientst from this data was estimated at a Ct of 3.44 and Cp of .77. The drainage area was divided into sub-areas according to the slope of the terrain. Runoff, routing and flood hydrograph combining was then performed as inflow to the reservoir.

The Probable Maximum Precipitation (PMP) was 20.5 inches according to Hydrometeorological Report (HMR #33) for a 24 hour duration, 200 square mile basin, while loss rates were set at 1.0 inches initial abstraction and 0.1 inches/hour continuous loss rate. The loss rate function yielded 84 percent runoff from the PMF. The PMF inflow hydrograph was 16,685 and the 1/2 PMF inflow was 9334. The large storage capacity of the reservoir reduced these flows to 4741 cfs for the PMF and 496 cfs for the 1/2 PMF. The reservoir has surcharge capacity between normal pool and top of dam to store 73 percent of the PMF runoff.

5.3 SPILLWAY CAPACITY

The spillway is a weir type structure 40 feet in length. A spillway coefficient of 3.2 was assigned for the spillway rating curve development. Immediately behind the weir, flows discharge through a 6 x 12 foot stone arch. The overall discharge capability of the spillway at the top of dam elevation is 717 cfs.

SPILLWAY CAPACITY

	Discharge	Capacity as % of PMF
PMF	4,741 cfs	17%
1/2 PMF	496 cfs	165%

5.4 RESERVOIR CAPACITY

The reservoir storage capacity is given below. This was estimated for USGS mapping.

Top of Dam	16,200 Acre Feet
Crest of Spillway	11,890 Acre Feet

5.5 FLOODS OF RECORD

There is no information on water levels at the dam site.

5.6 OVERTOPPING POTENTIAL

The HEC1-DB analysis indicates that the dam will be overtopped as follows:

OVERTOPPING IN FEET

PMF	0.96 Feet
1/2 PMF	None

The downstream hazard consists of approximately 12 residences adjacent to Limestone Creek through a 3 mile reach.

5.7 EVALUATION

The reservoir has the capacity to store the 1/2 PMF event. The PMF would overtop the dam by one foot for a period of 7 hours. Of concern is the possibility of rising waters flooding residences around the lake picking up floatable debris which could become clogged in the stone arch culvert structure causing the dam to be overtopped. Complete clogging of the high level spillway could cause the dam to be overtopped by 2-3 feet. Proper equipment should be available to remove floatable debris from the spillway in the event of serious flooding. The residents on the lake should be made aware of whom to notify for this task.

Therefore, although it has been determined that the spillway is inadequate to pass the PMF without overtopping the dam, according to the Corps of Engineers' Screening Criteria, the spillway is not considered seriously inadequate since the spillway will pass the 1/2 PMF without overtopping the dam.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

The dam embankment shows no evidence of misalignment, settlement or movement indicating structural instability.

On the dams downstream slope, throughout the general vicinity of the dams center section near the toe region, saturated and soft soils and marsh vegetation indicate an on-going seepage condition, however. Presumably, past embankment occurrances prompted the 1951 installation of the downstream underdrain system intended to collect embankment seepage before it created a piping/erosion problem. Most of the underdrain system is apparently functional, but is is known that some sections of drain line have been damaged and are not functioning.

The downstream slope of the embankment is heavily overgrown with trees and brush. The presence of the vegetation interferes with inspection of various areas of the dam.

The upstream face of the dam section is provided with a riprap of large stone, except for the freeboard zone which is provided with a vegetative cover. The riprap is generally in good condition, although stones are missing at various locations. In an area near the center of the dams length, erosion of the embankment earth beneath the riprap has occurred, causing sloughing. Riprap material near the easterly end of the dam consists of stone materials smaller than prevalent material used. It appears this area was rebuilt recently, possibly when localized sloughing resulted in loss of the original riprap.

The dams spillway and outlet channel located near the dams west end is a masonry structure which is in relatively good condition in the vicinity of the dam, but deteriorating near the northerly limits where it discharges in an area creek. Some mortar repair is indicated for virtually all areas of the spillway and outlet channel.

b. Geology and Seismic Stability

The DeRuyter Dam is located in the glaciated Allegheny Plateau Province, referred to by some as the Appalachian Upland. Bedrock in the region about the reservoir is of the Hamilton Group of Middle Devonian age. Regional dip is less than 1° to the south.

The reservoir and dam is within a glacial trough. Bedrock beneath the dam, would be of the Otisco member of the Ludlowville Formation of the Hamilton Group. Rock of the Otisco in this area varies from shale and silty shale to flaggy, calcareous siltstone. Depending upon the depth of glacial gouging, deeper bedrock would be strage-graphically lower shale rock units of Devonian age.

There is no indication that the dam is sited on bedrock. From the topographic map interpretation, the dam is most likely sited on glacial drift. Outwash and kame deposits appear to be present. A glacial sand pit is present north of the dam and appears to be kame-like, sorted and stratified silts and sands. Depth to bedrock is unknown.

The riprap, for most of the dam, is of large limestone blocks. At the east end of the dam about 150 feet of the upstream dam face is riprapped with loose beds (average thickness 1/2 to 1 inch) of calcareous siltstone. These beds were laid down in a horizontal orientation with a downstream tilt into the dam. A similar section of riprap is also present at the west end of the dam. Considering the small and poor quality of this riprap material it could be moved by wave action as well as frost heave.

c. Stability Evaluation

The dam embankment appears to be in good condition structurally except for the noted seepage. Brush on the downstream side should be thinned to permit easier access to all areas and permit better observation/detection of seeping areas or other conditions requiring attention. Tall trees near the upper section of embankment should be cut to prevent the danger of damage from storm-caused uprooting.

Necessary repairs should be accomplished for the downstream zones of the existing underdrain system to utilize the full extent of presently available protection against the seepage conditions which are known to occur. Areas of surfacing seepage need particularly be cleared of heavy vegetation and kept under observation. It should be anticipated that seepage zones persisting after the present underdrain collection system is fully operating could require an extension of the present system so to also handle new areas.

Necessary repair to the upstream riprap should be provided to prevent progressive deterioration. Corrections include replacing missing stone and stabilizing the zones where embankment erosion has caused the riprap to slough.

Necessary masonry repair should be provided for the spillway and outlet channel to prevent progressive damage. Damaged and deteriorated areas of the outlet channel should be rehabilitated. A maintenance program should include periodic removal of heavy debris from the channel.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

This Phase I inspection of the DeRuyter Dam did not indicate conditions which constitute an immediate hazard to human life or property. The dam would not be overtopped by a 1/2 PMF flood, but would be overtopped by almost one foot for 7 hours by the PMF event. Therefore, the spillway is not considered seriously inadequate, based on the Corps of Engineers' Screening Criteria, since it would not be overtopped by the 1/2 PMF.

The following specific safety assessments are based on the Phase I visual examination and analysis of hydrology and hydraulics, and structural stability:

1. The service spillway outlet is a 6 x 12 foot stone arch which could become clogged by floatable debris from the residences, boats, and docks that are located around the reservoir. No other emergency outlet exists. A low level outlet is used for flow augmentation.

2. The downstream face of the earthen dam which is 1600 feet in length is heavily overgrown with vegetation and large trees. These allow establishment of roots systems within the dam which could promote seepage. The growth also prohibits easy and close examination of the embankment surface to locate and monitor seepage.

3. A seepage condition is present throughout the general vicinity of the dams central downstream embankment area near the toe. Saturated and soft soils and marsh vegetation exist in this area even though the dam has an extensive underdrain system.

4. An excavation and repair on the subdrain system near the center of the embankment performed in 1978 to repair blockage in the drain line has not been backfilled.

5. Inspection of the subdrain system indicates that most of the underdrain system is apparently functional, but that some sections of drain line have been damaged and are not functioning.

6. The upstream face of the dam section is riprapped. In an area near the center of the dams length, erosion of the embankment earth below the riprap has occurred causing sloughing.

7. The extreme northerly end of the masonry spillway channel is severely deteriorated and undermined. This deterioration will progress up the channel if repairs are not made.

8. The three 12 inch valves in the low level control structure are badly deteriorated. One valve is, at present, inoperative; one can be only partially opened; while the third is operating, but badly corroded.

9. The mortar in the riprap, the inlet weir, and the spillway and outlet channel is partially deteriorated but in general is in fair condition.

10. No major deformation of the alignment of the structure was noted.

b. Adequacy of Information

The information available is adequate for this Phase I investigation.

c. Urgency

Items 1 through 9 in the safety assessment should be dealt with, and appropriate improvements and repairs should be performed within one year of this notification.

d. Need for Additional Information

Further investigations relative to the aforementioned 9 items in the safety assessment should be performed to determine appropriate remedial measures.

7.2 RECOMMENDED MEASURES

a. Results of follow-up, investigation will determine the remedial measures required. The following is a list of the remedial work:

1. Proper equipment to remove large floatable debris which may clog in the spillway culvert should be available in the event of serious flooding. A notification system chould be provided for use during emergencies.

2. Brush on the downstream side should be removed to permit easier access to all areas and permit better observation/detection of seeping areas or other conditions requiring attention. Trees on the embankment should be removed to eliminate damage from storm-caused uprooting.

3. After clearing the embankment, the areas where seepage is suspected should be inspected.

4. Necessary repairs should be made to the existing underdrain system to utilize the available protection against the seepage

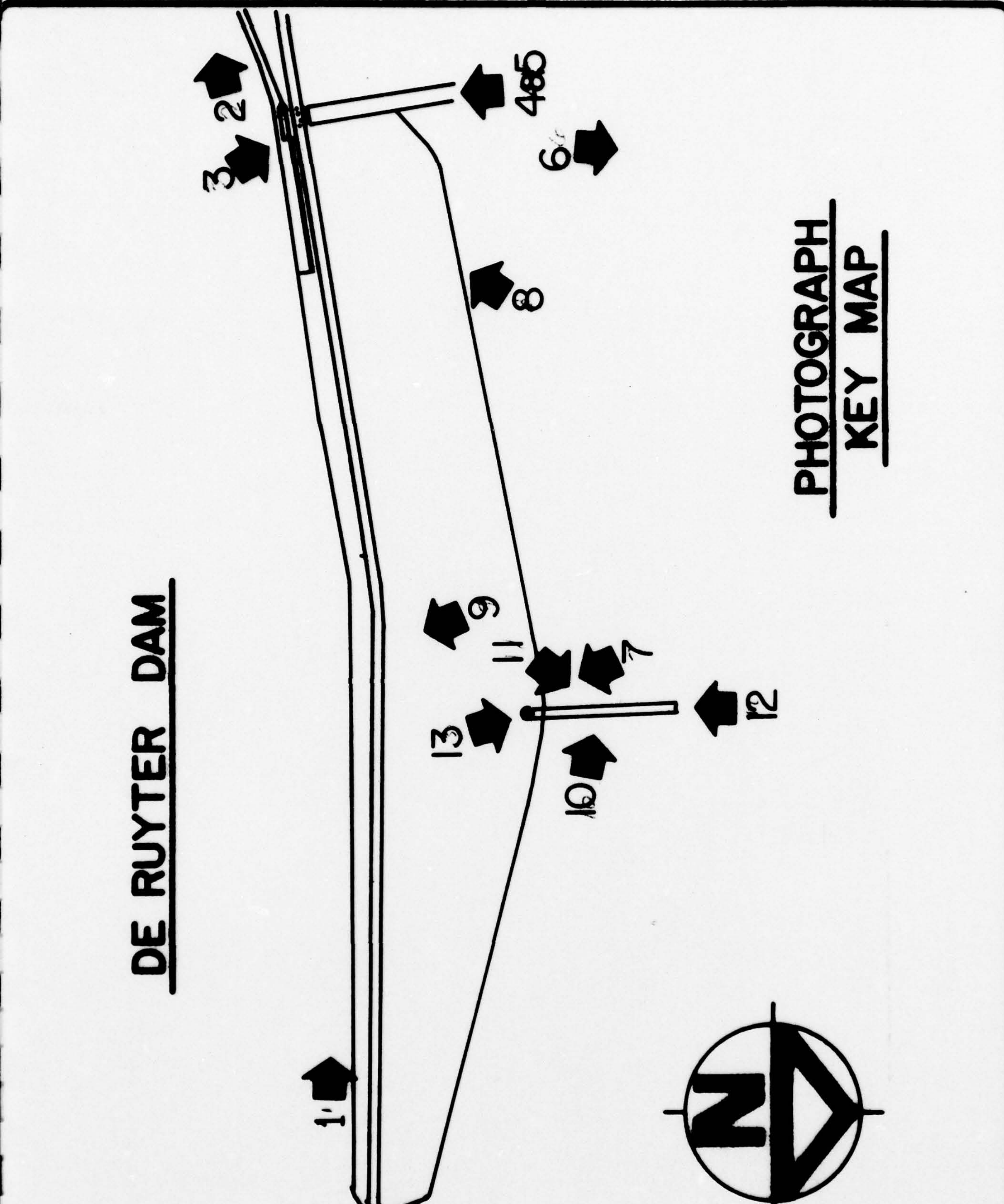
conditions which are known to occur. Areas of surfacing seepage should be cleared of heavy vegetation and kept under observation. It should be anticipated that seepage zones persisting after the present underdrain collection system is fully operating could require an extension of the present system to also handle new areas.

5. Backfill the open excavation at the toe of the dam near the center of the embankment.

6. The riprap should be repaired to prevent progressive deterioration. Corrections include replacing missing stone and stabilizing the zones where embankment erosion has caused the riprap to slough.

7. The spillway and outlet channel should be repaired to prevent progressive damage. Damaged and deteriorated areas of the outlet channel should be rehabilitated. A maintenance program should include periodic removal of heavy debris from the channel.

8. Repair or replace low level outlet valves.



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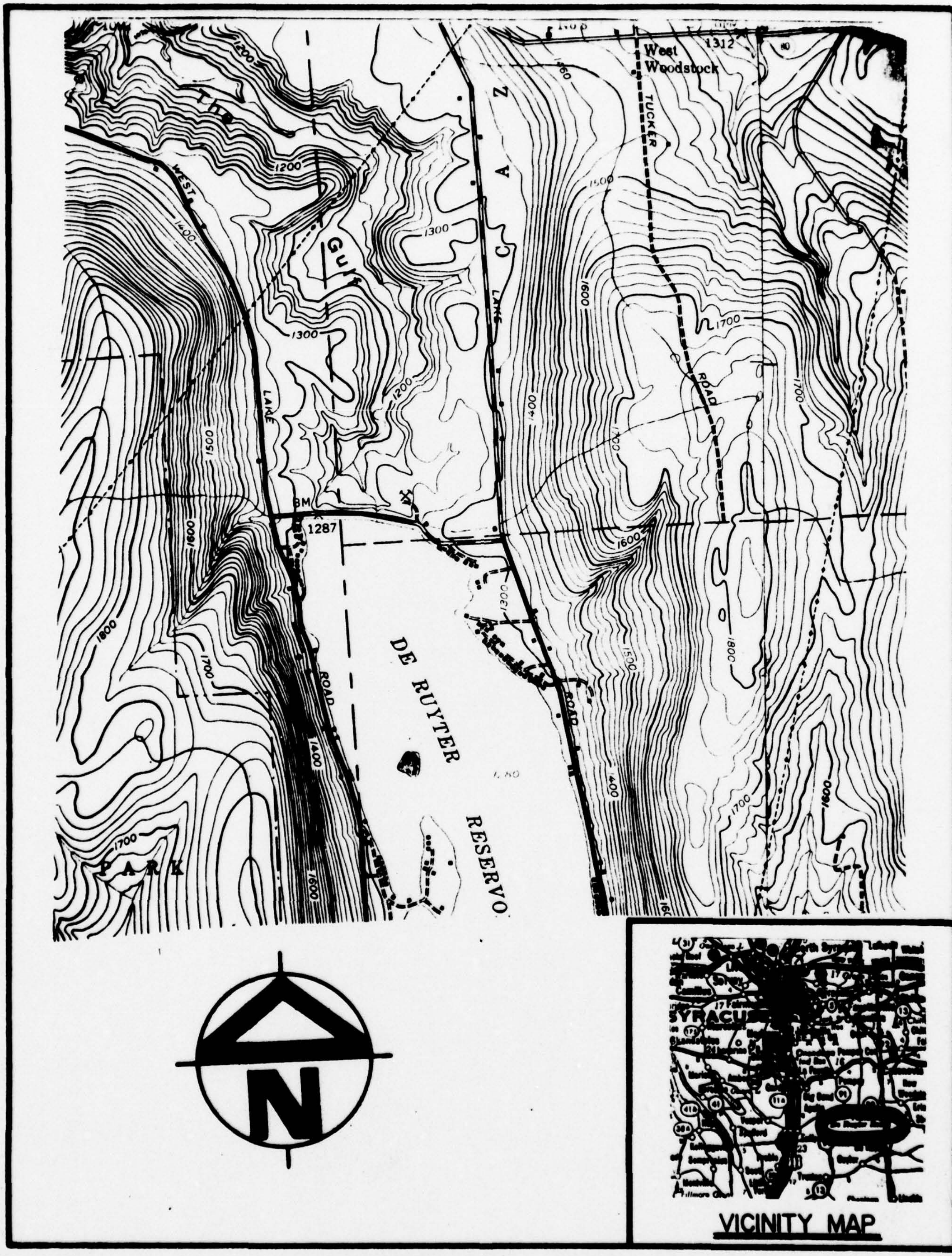
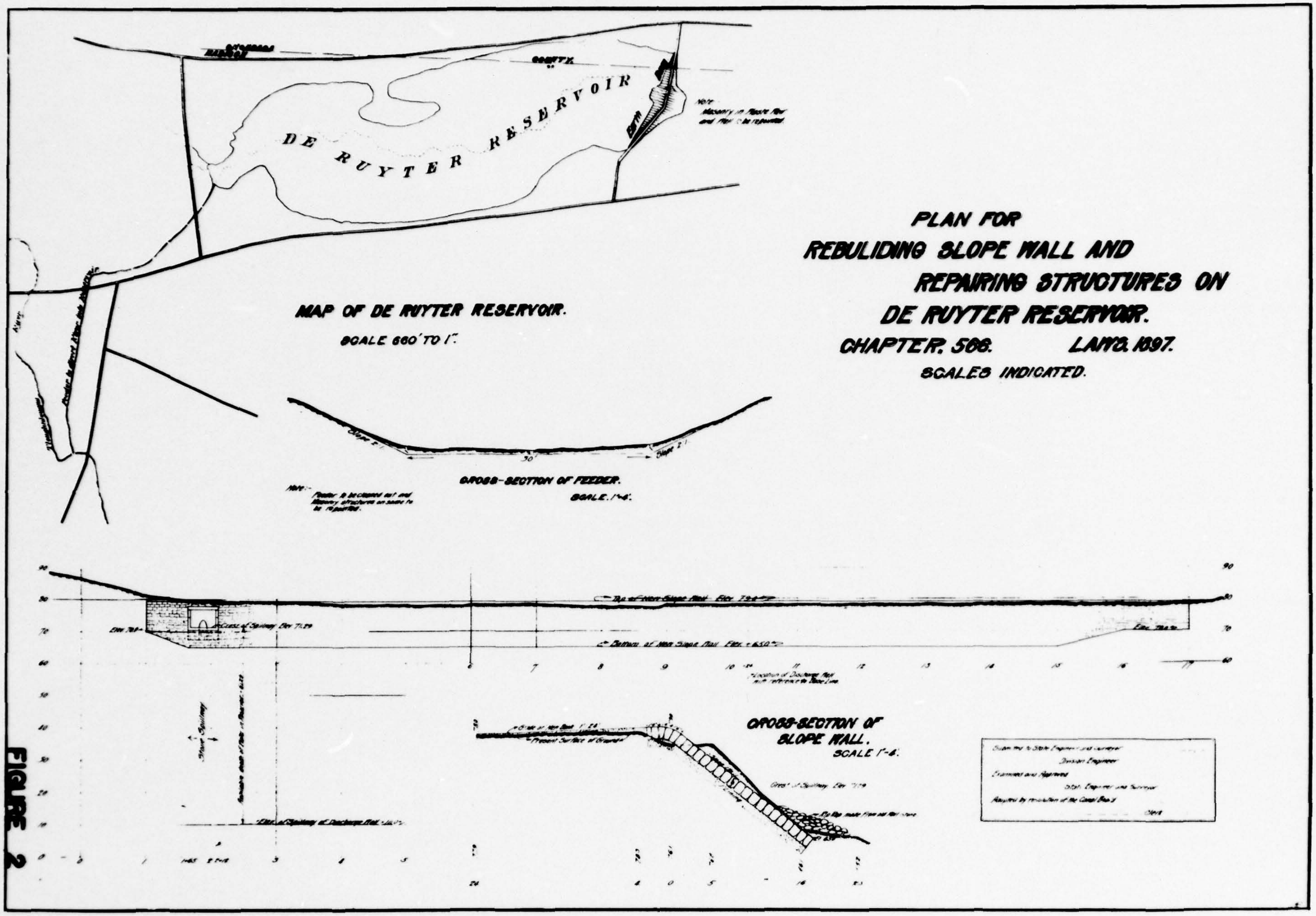
	JOB 2305	APP'D



LOCATION PLAN

FIGURE 1



PLAN FOR
REBULIDING SLOPE WALL AND
REPAIRING STRUCTURES ON
DE RUYTER RESERVOIR.
CHAPTER. 566. LAWS. 1897.
SCALES INDICATED.
DE RUYTER RESERVOIR
MAP OF DE RUYTER RESERVOIR.
SCALE 660' TO 1".
CROSS-SECTION OF FEEDER.
SCALE. 1"-4'.
CROSS-SECTION OF
SLOPE WALL.
SCALE 1"-4'.

FIGURE 2

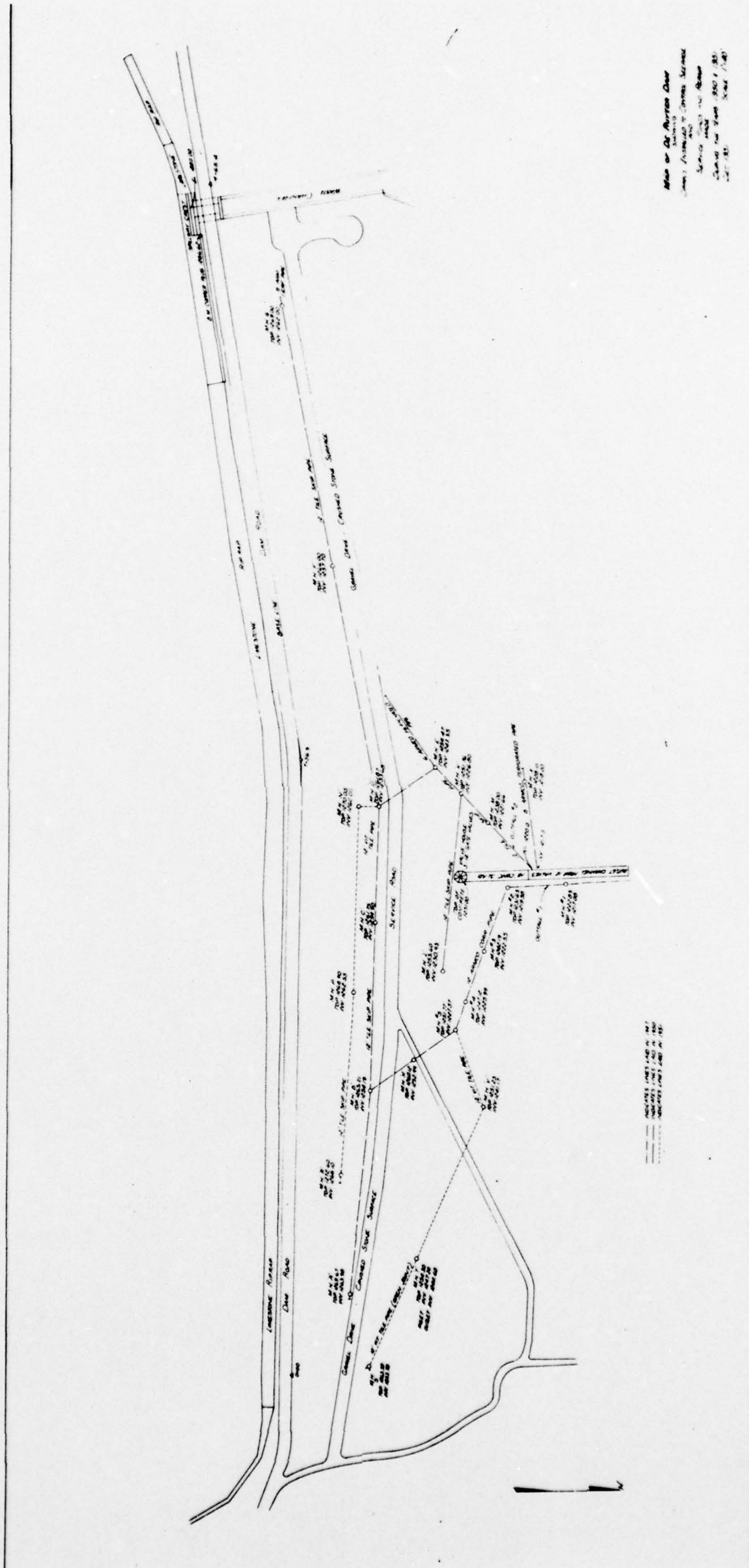

Limestone Riprap
Dam Road
Crushed Stone Surface
Service Road

FIGURE 3

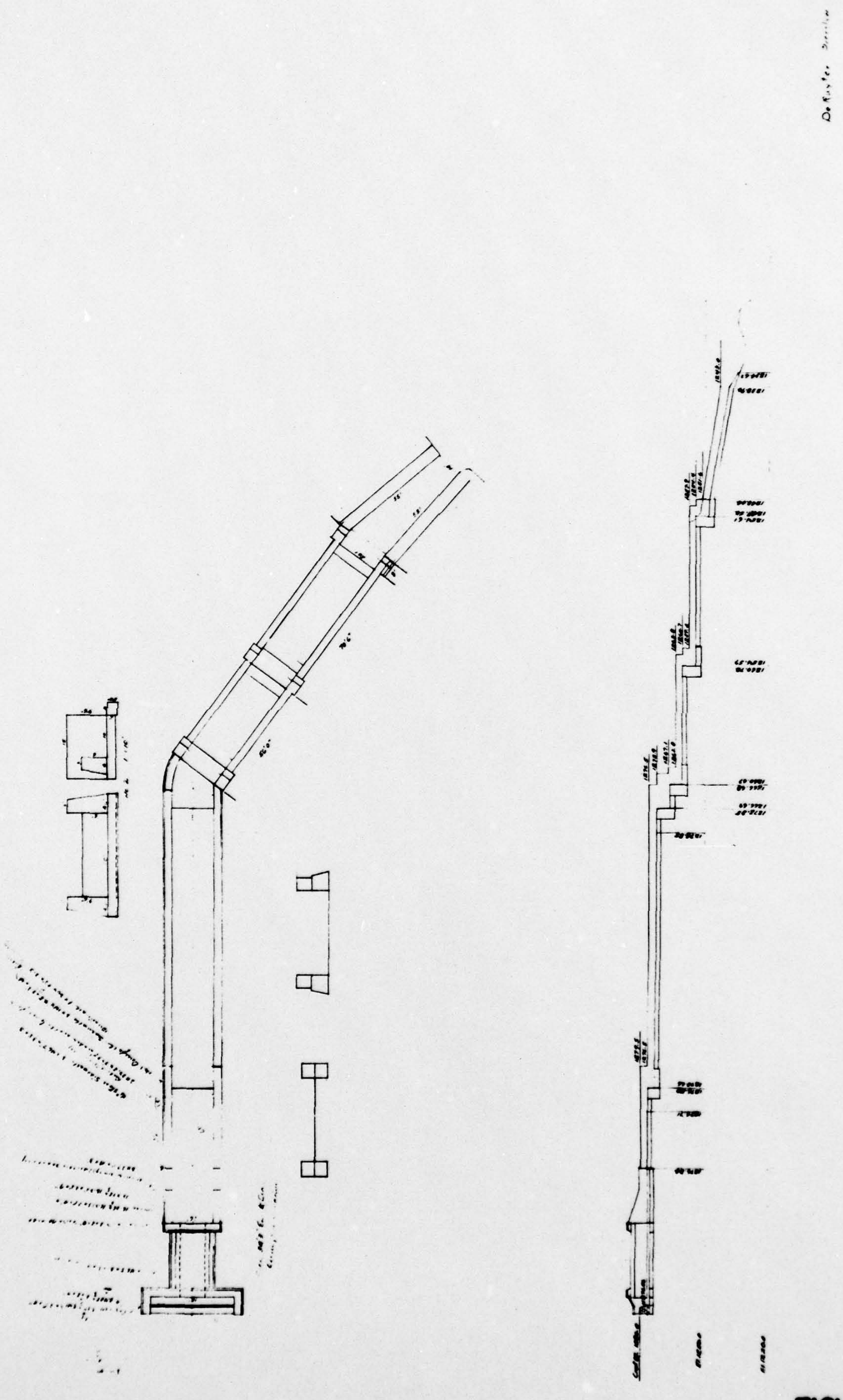


FIGURE 4

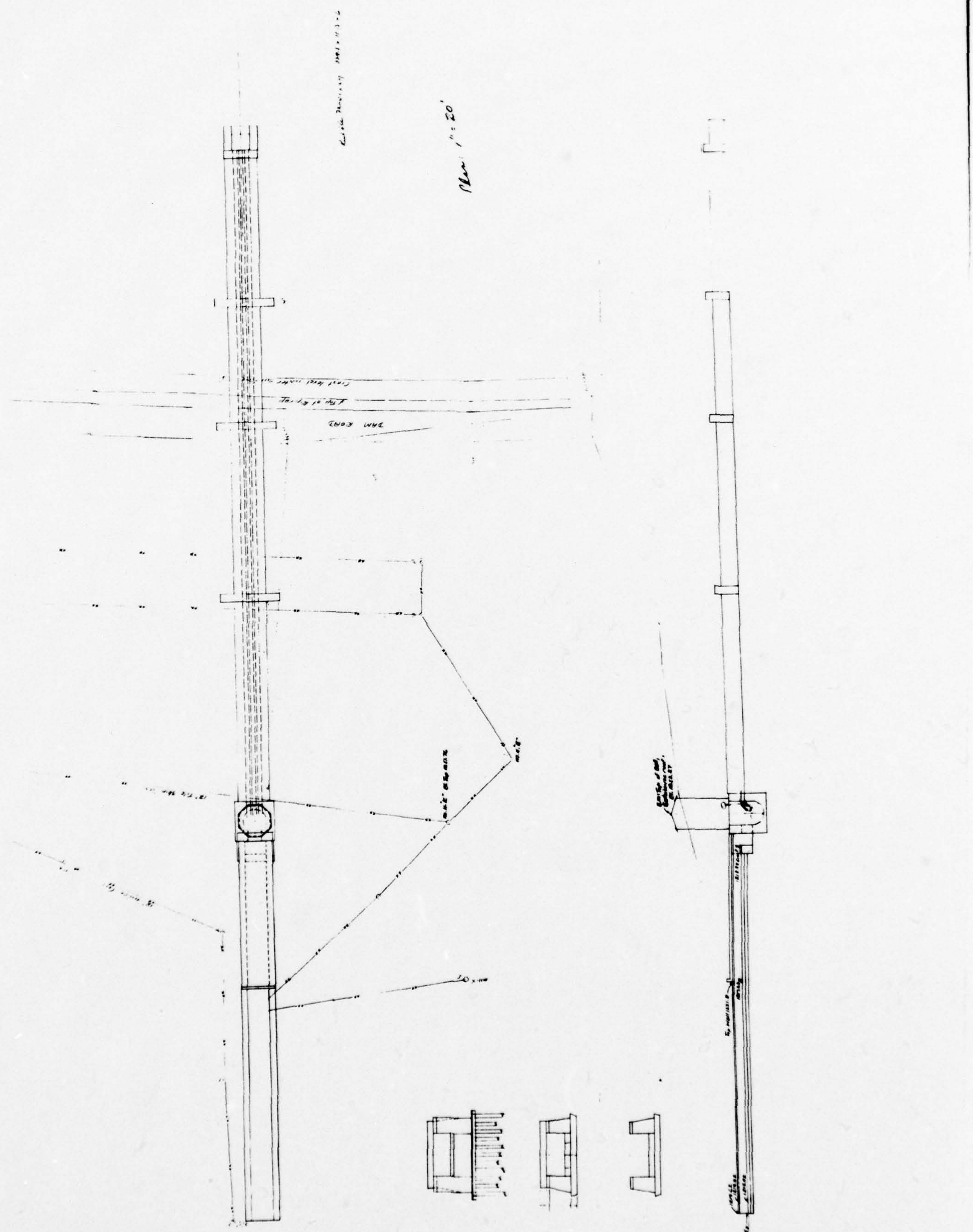
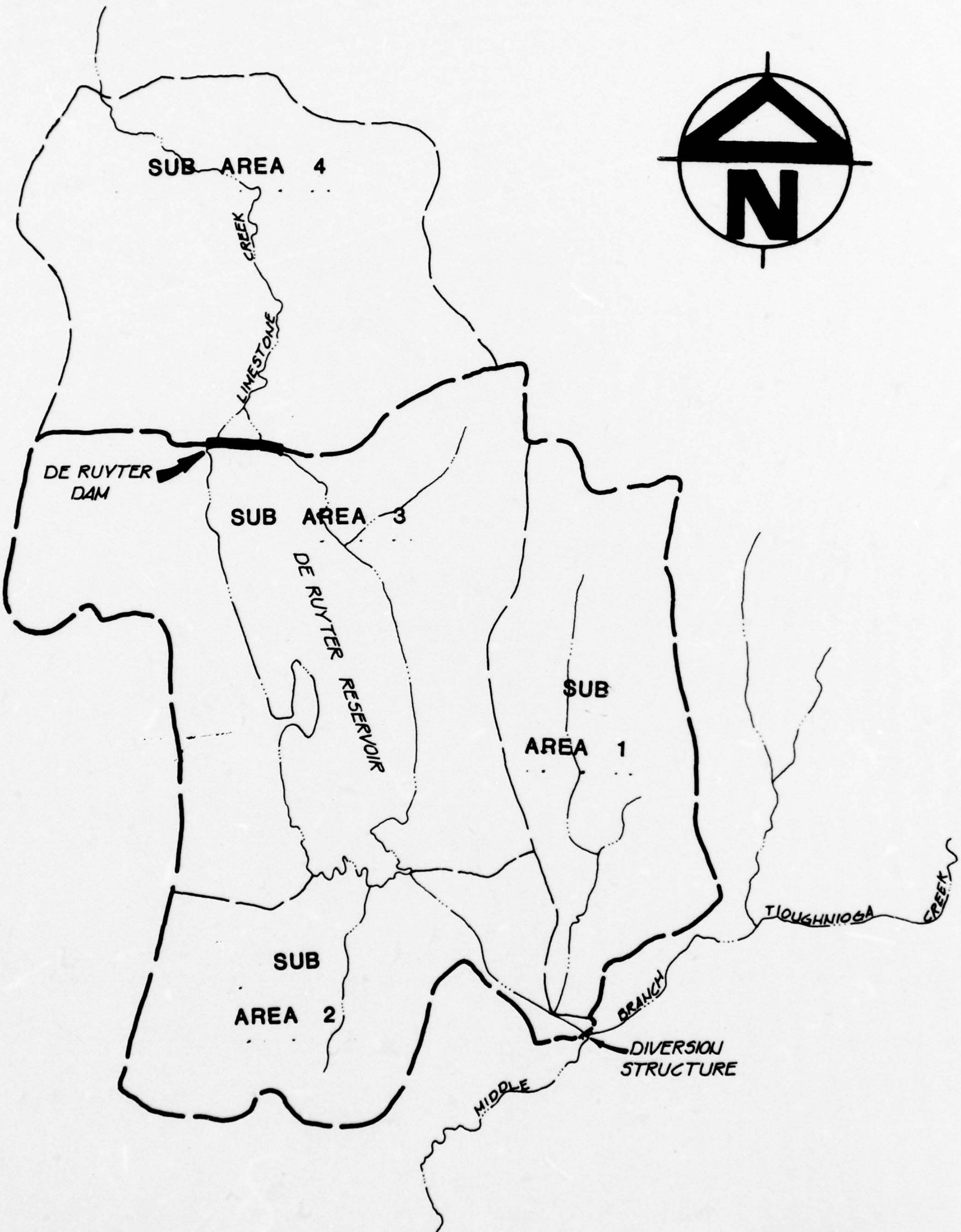


FIGURE 5



SUB AREA 4
CREEK
LIMESTONE
DE RUYTER DAM
SUB AREA 3
DE RUYTER RESERVOIR
SUB AREA 1
SUB AREA 2
TIOUGHNIOGA CREEK
BRANCH
DIVERSION STRUCTURE
MIDDLE

FIGURE 6

APPENDIX A

FIELD INSPECTION REPORT

CHECK LIST
VISUAL INSPECTION

PHASE 1

Name Dam DeRuyter Dam **County** Onondaga Madison **State** New York **ID #** 774

Type of Dam Earthen **Hazard Category** High

Date(s) Inspection June 13, 1979 **Weather** Fair **Temperature** 60°±

Pool Elevation at Time of Inspection 1277± **M.S.L.** **Tailwater at Time of Inspection** N/A.

Inspection Personnel:

F.W. Byszewski	Stetson-Dale	Richard Aldrich NYSDOT (Region 3)
N.F. Dunlevy	Stetson-Dale	
D.F. McCarthy	Stetson-Dale	
H. Muskatt	Stetson-Dale	

N.F. Dunlevy **Recorder**

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	N.A.	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	N.A.	
DRAINS	N.A.	
WATER PASSAGES	N.A.	
FOUNDATION	N.A.	

CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	N.A.	
STRUCTURAL CRACKING	N.A.	
VERTICAL & HORIZONTAL ALIGNMENT	N.A.	
MONOLITH JOINTS	N.A.	
CONSTRUCTION JOINTS	N.A.	
STAFF GAGE OF RECORDER	N.A.	

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None observed.	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None observed.	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	None observed.	Difficult to identify the point where abutment meets original ground due to heavy growth at brush trees.
VERTICAL AND HORIZONTAL ALINEMENT OF THE CREST	None observed.	
RIPRAP FAILURES	None observed.	Majority of dam - dry laid riprap. Different type of riprap near east abutment. Probably repaired. Riprap grouted near spillway.

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
EXCAVATIONS	Open excavation just west of control structure. Very unstable bottom. Abandoned attempt to unclog sub-drains.	Should be filled and properly compacted.
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	See Sheet 4.	
ANY NOTICEABLE SEEPAGE	Possibly at toe of slope, westerly half of dam.	Ditch invert at toe of slope is saturated, very soft. No flowing water.
STAFF GAGE AND RECORDER	None.	
DRAINS	Checked flow at manholes.	Slight to moderate flow in manholes. Substantial (10± GPM) at outlet from westerly slope. Clear water, no fines observed.

UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	Masonry weir, some deterioration of mortar joints.	Repoint.
APPROACH CHANNEL	None.	
DISCHARGE CHANNEL	Good condition except for end - 350± from spillway, severely undermined.	Repair.
BRIDGE AND PIERS	Concrete arch culvert. Good condition.	

GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	None.	
APPROACH CHANNEL	None.	
DISCHARGE CHANNEL	None.	
BRIDGE AND PIERS	None.	
GATES AND OPERATION EQUIPMENT	None.	

OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	N.A.	
INTAKE STRUCTURE	Submerged.	
OUTLET STRUCTURE	Three, 24 inch pipes with gate valves at outlet end.	One valve unoperative. One valve operates only part way. One valve operates. REPAIR OR REPLACE.
OUTLET CHANNEL	Good condition.	
EMERGENCY GATE	None.	

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Good condition. No observed recent erosion except at end of spillway masonry channel.	
SLOPES	No instability observed.	
APPROXIMATE NO. OF HOMES AND POPULATION	13-15 hours within one mile.	HGH hazard.

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None.	
OBSERVATION WELLS	None.	
WEIRS	None.	
PIEZOMETERS	None.	
OTHER	None.	

RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	No instability observed.	
SEDIMENTATION	Minimal.	

CHECK LIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE 1

NAME OF DAM ____________

ID # ____________

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	Included.
CONSTRUCTION HISTORY	None.
TYPICAL SECTIONS OF DAM	Included minimal dimensions.
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	None.
RAINFALL/RESERVOIR RECORDS	None.

ITEM	REMARKS
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None.
POST-CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	None.

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Riprap repair 1897. Sub-drains installed 1947, 1950, 1951.
HIGH POOL RECORDS	None.
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None.
MAINTENANCE OPERATION: RECORDS	Inspection reports included.

ITEM	REMARKS
SPILLWAY PLAN SECTIONS DETAILS	
OPERATING EQUIPMENT PLANS & DETAILS	

CHECK LIST
HYDROLOGIC & HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 5.60

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): 1280

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): ---

ELEVATION MAXIMUM DESIGN POOL: ---

ELEVATION TOP DAM: 1287

CREST:

a. Elevation 1280
b. Type Weir controlling inflow into 6 x 12 ft. stone arch culvert.
c. Width Weir 3 ft.
d. Length Weir 40 ft.
e. Location Spillover West side of dam.
f. Number and Type of Gates None.

OUTLET WORKS:

a. Type Three, 12 in. steel pipes.
b. Location Low level center of dam.
c. Entrance Inverts ---
d. Exit Inverts Approximately 1219
e. Emergency Draindown Facilities Three pipes.

HYDROMETEOROLOGICAL GATES:

a. Type ---
b. Location ---
c. Records ---

MAXIMUM NON-DAMAGING DISCHARGE: ---

APPENDIX B

PREVIOUS INSPECTION REPORTS/RELEVANT CORRESPONDENCE

(1)

STRUCTURE INVENTORY - GENERAL LISTING

STRUCTURE ID NO SEC/HIST TYPE	CANAL	STATION - APPROX STRUCTURE CENTER	POOL ELEV (LOW/ONLY)	LIFT/ HIGHT	TUNNEL SZ/ NO GATES	ORIG CONTRACT	HISTORICAL NAME AND LOCATON
WS F0F1 701 2A	F						BRIDGE ACROSS LIMESTONE FEEDER
WS F0R5 701 2A	F						FARM BRIDGF OVER LIMESTONE CREEK
WS 0002 701 2B	O	116+50				103	LOCK ST BR PHOENIX
WS 0003 701 2B	C	122+65				85	BRIDGE ST BR PHOENIX
WS 0004 701 2B	O	126+30	352.8			167	CULVERT ST BR PHOENIX
WS 0007 701 2B	O	613+65				117	SWING BR AT LOCK 02
WS 0001 701 2C	E						BRIDGE OVER OLD CAUGHDENOY LOCK
WS F0B1 701 2C	F						ANDREWS ROAD BRIDGE
WS F0B2 701 2C	F						FARM BR. S. OF ANDREWS RD., BUTTERNUT FEEDER
WS F0D1 701 2C	F						TWIN PIPE CULV S.LAKE RD - DERUYTER
WS F0D2 701 2C	F						BOX CULV. E. LAKE ROAD DERUYTER
WS F0D3 701 2C	F						FARM BRIDGE , DERUYTER INLET
WS F0D4 701 2C	F						FARM BRIDGE , DERUYTER INLET
WS F0D5 701 2C	F						BRIDGE OVER DERUYTER OVERFLOW
WS 0024 701 3A	E	3932+00	374.0	13.2		45	BALDWINSVILLE DAM
WS F0B1 701 3A	F			5.0			BUTTERNUT CREEK DIVERSION DAM
WS F0D1 701 3A	F		1288.0	70.0			DERUYTER DAM
WS F0D2 701 3A	F						DERUYTER INLET DIVERSION DAM
WS F0F1 701 3A	F		430.0	6.5			LIMESTONE CREEK DIVERSION DAM
WS F0J1 701 3A	F		645.5				JAMESVILLE DAM
WS 0001 701 3A	O	117+00	363.0	11.0	6	80	PHOENIX DAM Total Dam
WS 0002 701 3A	O	608+60				10	UPPER DAM FULTON "
WS 0003 701 3A	O	641+00	335.0	17.0		10	LOWER DAM - FULTON Key J
WS 0005 701 3A	O	971+00	308.0	19.5		37	DAM 5 AT MINETTO
WS 0006 701 3A	O	1146+25	290.0	33.0		37	DAM 6 -HIGH DAM AT LOCK 04 - OSWEGO

3/5 (1a)

FINAL DATE 1977

	STRUCTURE ID NO	TYPE	FOUND + ABUTM: FOOTING	FOUND + ABUTM: APRONS	FOUND + ABUTM: WALLS	SPILLWAYS: CREST	SPILLWAYS: U/S TRM FACE	SPILLWAYS: D/S TRM FACE	SPILLWAYS: JOINTS	SPILLWAYS: FLASHBDS	DAM-CONC: 1	DAM-CONC: UPSTRM FACE	DAM-CONC: DWNSTRM FACE	DAM-CONC: JOINTS	DAM-CONC: VALVES WELLS	DAM EARTH: 1	DAM EARTH: UPSTRM FACE	DAM EARTH: DWNSTRM FACE	WTR CNTRL DEVICES: 1	WTR CNTRL DEVICES: 2	WTR CNTRL DEVICES: 3	WTR CNTRL DEVICES: 4	WTR CNTRL DEVICES: 5	WTR CNTRL DEVICES: 6	GATE HOUSE: ROOFS	GATE HOUSE: WALLS	GATE HOUSE: FLOORS	GATE HOUSE: ROLLING DOORS	GATE HOUSE: SPAWN/WINDOWS	GENERAL RECOMMEND	
	5 0024	3A	X	X	5	5	X	7	5	N	N	U	N	N	N	N	N	N	N	N	N	U	N	N	U	N	N	N	N	5	~~Joint~~ Joints need grouting
	5 F0B1	3A	N	X	0	7	X	X	7	N	N	N	N	N	N	N	N	N	U	N	N	N	N	N	N	N	N	U	N	5	Washout under N. Wingwall resulting in collapse
#33	5 F0D1	3A	N	N	N	N	N	N	N	N	N	N	N	N	N	7	7	7	N	N	N	N	N	N	7	7	N	7	5	7	Underdrains plugged - need repair & replacement
#34	5 F0D2	3A	N	3	7	7	7	7	3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	apron planks miss. leaks thru stone in crest
	5 F0F1	3A	N	3	4	7	X	7	X	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	East W. wall settling
	–		X	N	N	7	X	3	0	N	7	5	1	0	N	N	N	N	N	N	N	N	N	N	5	7	X	N	7	1	bulge in downstream face, increased leak. West side, pt. jts., remove bru
#1	5 [illegible]001	3A	X	X	5	7	X	7	X	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#14	5 [illegible]002	3A	X	7	7	5	X	3	X	5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	5	
#18	5 [illegible]003	3A	X	N	3	3	X	3	3	N	3	X	3	3	N	N	N	N	U	N	N	N	N	N	N	N	N	N	N	5	
#24	5 [illegible]005	3A	X	X	3	3	X	3	X	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	
#26	5 [illegible]006	3A	X	X	3	5	X	5	X	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	5	
#28	5 [illegible]007	3A	X	7	7	7	X	7	5	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
	5 X001	3A	3	N	3	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	
	5 Y001	3A	X	5	5	3	3	3	3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	

STRUCTURE INVENTORY - GENERAL LISTING

STRUCTURE ID NO SEC/HIST	TYPE	CANAL	STATION - APPROX STRUCTURE CENTER	POOL ELEV (LOW/ONLY)	LIFT/ HIGHT	TUNNEL SZ/ NO GATES	ORIG CONTRACT	HISTORICAL NAME AND LOCATON
WS 0037 701	3A	O	1166+00	270.0	12.0		35	CURVED DAM AT LOCK 07 - OSWEGO
WS X001 701	3A	X						CARPENTER BROOK DIVERSION DAM (NOT NEEDED)
WS Y002 701	3A	Y	5090+00	375.4			5	OWASCO CREEK ENTRANCE 550FT LEFT
WS 0023 701	3C	E		369.9	8.0		M93	CAUGHDENOY DAM
WS 0124 701	3D	E	3931+50			1	635	TAINTAR GATE CONT M63-5
WS F002 701	3D	F				1		WASTE GATE - BUTTERNUT AQUEDUCT
WS F0B1 701	3D	F				2		BUTTERNUT FEEDER BULKHEAD
WS F004 701	3D	F				4		DERUYTER INLET HEADGATES
WS F003 701	3D	F			5.0			STREAM ENT. - DERUYTER INLET
WS F001 701	3D	F		1280.0	3.0			DERUYTER DAM SPILLWAY
WS F002 701	3D	F				3		DERUYTER DAM OUTLET GATES
WS FOF1 701	3D	F				4		LIMESTONE FEEDER BULKHEAD
WS F001 701	3D	F				1		WASTE GATE - LIMESTONE AQUEDUCT
WS FGJ1 701	3D	F						JAMESVILLE DAM SPILLWAY
WS FOJ2 701	3D	F				3		JAMESVILLE DAM OUTLET GATES
WS 0031 701	3D	O		363.0	12.0	6	80	TAINTAR GATES Key E, Movable Crest
WS 0021 701	3D	O		363.0			80	NORTH AUTO FLASHBOARD BLOCKED TOP Key D
WS 0051 701	3D	O		363.0			80	SOUTH AUTO FLASHBOARD BLOCKED TOP Key F
WS 0011 701	3D	O		363.0	11.0		80	NORTH SPILLWAY Key D
WS 0041 701	3D	O		363.0	11.0		80	SOUTH SPILLWAY Key F
WS 0012 701	3D	O		352.8	10.3		10A	SPILLWAYS Key H
WS 0022 701	3D	O				6	10A	TAINTOR GATES Key I
WS 0001 701	3D	O	661+00	311.0			205	SPILLWAY IN DIKE BELOW LOCK 03
WS 0005 701	3D	O	1180+75				35	BY-PASS CULVERT ABOVE LK 07 2 GATES
WS 0007 701	3D	O	1184+80			1	709	FEED GATE - LOCK 07

SLUICE GATES, SPILLWAYS, WASTE WEIRS -1977

STRUCTURE ID NO: SCTN	STRC NO	TYPE	CONCRETE: ABTMNTS	PIERS BLKHDS	UPSTRM APRON	DWNSTRM APRN	SPLLWY SRFCE	SPHN INTRIOR	SUPER STRUCTURE: OPRTNG TRESTLE	CATWALKS	RAILINGS	MACHINERY: STEM, GEARING	FLR STD ETC	SL GATES: SPHN VLV LNR	GATE FRAME	GATES SKN PLATE	GATE SEALS	SEATS	GUIDES	GATES FLSHBRDS: BOARDS	ANCHORS	STPLGS: STOPLOGS	GUIDES	ELECT: MOTORS	WIRING	TRASH RACKS	GEN RECOMMEND	
5	0124	3D	7	7	X	X	7	N	7	7	7	7	N	N	7	7	7	7	7	N	N	N	N	7	7	N	7	N. cable frayed
5	F002	3D	7	N	N	N	N	N	N	N	N	N	N	N	7	7	7	6	7	N	N	N	7	N	N	N	7	
5	F0[illegible]	3D	7	7	X	X	X	N	N	N	N	N	N	N	X	X	X	X	7	N	N	N	7	N	N	N	7	
#35 5	F0[illegible]	3D	7	7	X	7	N	N	7	7	7	7	7	N	7	7	7	7	7	7	7	N	N	N	N	7	7	clear brush out of walls, clean silt + debris above
#36 5	[illegible]	3D	7	N	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	some stones moved
#37 5	[illegible]	3D	7	N	7	7	3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	broken floor stand
#38 5	F002	3D	N	N	N	N	N	N	7	N	N	3	1	N	X	X	7	7	X	N	N	N	N	N	N	N	3	
5	F0[illegible]1	3D	7	3	X	7	N	N	N	7	7	N	N	N	N	N	N	N	N	N	N	7	7	N	N	N	7	
5	F001	3D	7	N	N	N	N	N	N	N	N	N	N	N	N	5	5	5	5	N	N	N	N	N	N	N	5	
5	F0J1	3D	7	N	X	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	Abutment needs pointing
5	F0J2	3D	N	N	N	N	N	N	3	N	N	3	3	N	X	X	X	X	X	N	N	N	N	N	N	N	3	
#2 5	0081	3D	1	1	N	X	N	N	N	3	3	5	5	N	1	1	1	X	N	N	N	N	N	N	N	N	1	main anch. poor, elect. poor, finish paint, all conc. poor
#3 5	0021	3D	5	N	N	X	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#4 5	0051	3D	5	N	N	X	5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#5 5	0011	3D	5	N	N	X	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#6 5	0041	3D	3	N	N	X	3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#15 5	0012	3D	3	1	N	5	1	N	N	N	N	N	N	N	N	N	N	N	N	7	5	N	N	N	N	N	3	6"+/- of surface worn away, corner pier - v. poor, hole in spill crest
#16 5	0022	3D	7	7	X	7	N	N	N	7	7	7	7	N	5	5	3	7	N	N	N	N	N	N	N	N	3	Allign. racks + pinion, paint, leakage thru abut wall
5	0001	3D	3	N	N	X	1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	1	
#29 5	0005	3D	7	7	N	X	X	N	6	N	N	7	7	N	7	7	7	7	7	N	N	N	N	N	N	N	5	
#30 5	0007	3D	7	N	X	N	N	N	7	N	N	7	7	N	7	7	7	7	7	N	N	N	N	7	7	X	7	
5	0002	3D	3	N	N	N	7	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	Paint frame holding grating
5	0003	3D	7	N	N	N	7	N	N	7	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
5	Y001	3D	5	N	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	

[redacted]

	STRUCTURE ID NO SEC/HIST TYPE	CANAL	STATION - APPROX STRUCTURE CENTER	POOL ELEV (LOW/ONLY)	LIFT/ HIGHT	TUNNEL SZ/ NO GATES	ORIG CONTRACT	HISTORICAL NAME AND LOCATON
	WS 0002 701 3D	O	1191+00	255.8			W64	SIDE SPILLWAY BETWEEN LOCKS 07 & 08
	WS 0003 701 3D	O	1203+71	255.8			W64	SIDE SPILLWAY WEST WALL ABOVE LOCK 8
	WS Y001 701 3D	Y	60+15				T20	ONONDAGA CREEK SPILLWAY
	WS 0224 701 3E	E	3931+90				208	TAINTOR GATE NW POWER RACE 530 FT L
9	WS F001 701 3E	F						OVERFLOW FLUME -DERUYTER DAM
10	WS F002 701 3E	F						DERUYTER OUTLET FLUME
7	WS 0051 701 3E	O	118+80			3	80	SOUTH HEADGATE NO 1 PLUGGED Key G
8	WS 0061 701 3E	O	119+10			4	80	SOUTH HEADGATE NO 2 PLUGGED " "
9	WS 0071 701 3E	O	119+40			3	80	SOUTH HEADGATE NO 3 PLUGGED " "
10	WS 0011 701 3E	O	121+80	352.0	13.3	8	80	NORTH HEADGATE NO 1 Raceway SILL
11	WS 0021 701 3E	O	121+56			3	80	NORTH HEADGATE NO 2 PLUGGED Key C
12	WS 0031 701 3E	O	121+42			3	80	NORTH HEADGATE NO 3 PLUGGED " "
13	WS 0041 701 3E	O	121+28			3	80	NORTH HEADGATE NO 4 PLUGGED " "
14	WS 0053 701 3E	O	640+00				108	POWER FOREBAY - LOCK 03 - FULTON Key D
10	WS 0043 701 3E	O	640+35			2	108	BULKHEAD NO 4 W SIDE LOWER DAM Key M
11	WS 0033 701 3E	O	640+50			10	108	BULKHEAD NO 3 W SIDE LOWER DAM " "
12	WS 0023 701 3E	O	642+20			3	108	BULKHEAD NO 2 E SIDE LOWER DAM Key H
13	WS 0063 701 3E	O	652+00				10	POWER TAILRACE BELOW LOCK 03 Key P
15	WS 0005 701 3E	O	972+15				37	BULKHEAD NO 5 - MINETTO
17	WS 0052 701 3E	O				17	10	BULKHEAD NO 5 (UPPER DAM) Key G
	WS 0006 701 3E	O	1145+90			24	37	BULKHEAD NO 6 - HIGH DAM - OSWEGO
	WS 0077 701 3E	O	1169+06			24		BULKHEAD NO7 - CURVED DAM - OSWEGO
	WS 0017 701 3E	O	1185+00				35	HYDRAULIC CANAL BULKHEAD (SEALED)
8	WS 0001 701 4A	E		369.9			T28	CLEVELAND TERMINAL
5	WS 0002 701 4A	E						DOCK-FRENCHMANS IS

3E-546

(3a)

SLUICE GATES SPILLWAYS WASTE WEIRS - 1977

	STRUCTURE ID NO			CONCRETE						SUPER STRUCTURE			MACHINERY			SL GATES					GATES FLSHBRDS		STPLGS		ELECT				
	SCTN	STRC	TYPE	ABTMNTS	PIERS BLKHDS	UPSTRM APRON	DWNSTRM APRN	SPLLWY SRFCE	SPHN INTRIOR	OPRTNG TRSTLE	CATWALKS	RAILINGS	STEM GEARING	FLR STD ETC	SPHN VLVL LNR	GATE FRAME	GTE SKN PLATE	GATE SEALS	SEATS	GUIDES	BOARDS	ANCHORAGE	STOPLOGS	GUIDES	MOTORS	WIRINGS	TRACKS RACKS	GEN RECOMMEND	
	5	0224	3E	5	N	X	X	X	N	7	7	7	7	7	N	6	6	X	X	N	3	3	N	N	N	N	N	5	
#7	5	F001	3E	N	N	N	N	3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	3	
#2	5	F002	3E	7	N	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	9	
#7	5	0051	3E	3	7	N	N	N	N	N	N	7	N	N	N	X	X	X	X	X	N	N	N	N	N	N	N	9	
#8	5	0061	3E	5	7	N	N	N	N	N	N	7	N	N	N	X	X	X	X	X	N	N	N	N	N	N	N	9	
#9	5	0071	3E	3	7	N	N	N	N	N	N	7	N	N	N	X	X	X	X	X	N	N	N	N	N	N	N	9	
#10	5	0011	3E	5	5	X	X	N	N	7	5	3	7	3	N	3	3	3	3	3	N	N	N	N	N	N	N	3	
#11	5	0021	3E	5	5	X	X	N	N	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#12	5	0031	3E	5	5	X	X	N	N	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#13	5	0041	3E	5	3	X	X	N	N	N	N	7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	
#19	5	0053	3E	6	6	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	9	
#20	5	0043	3E	7	3	X	X	N	N	N	N	7	3	3	N	X	X	X	X	X	N	N	N	N	N	N	N	3	
#21	5	0033	3E	7	3	X	X	N	N	N	N	7	3	3	N	X	X	X	X	X	N	N	N	N	N	N	N	3	
#22	5	0023	3E	3	3	X	X	N	N	N	N	1	3	3	N	X	X	X	X	X	N	N	N	N	X	3	3	3	
#23	5	0063	3E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	X	N	N	3	131K Cleaned dump fill + debris, breach in wall to Canal also at ...
#25	5	0005	3E	5	3	N	N	N	N	7	3	7	3	N	N	3	1	3	N	N	N	N	N	N	N	N	N	3	
#11	5	0052	3E	7	5	X	X	N	N	N	7	N	3	3	N	3	X	X	X	X	N	N	N	N	N	N	N	5	
#27	5	0006	3E	3	5	N	N	N	N	7	7	N	N	3	N	5	4	X	X	5	N	N	N	N	N	N	N	5	
#21	5	0077	3E	7	7	X	X	N	N	5	N	7	N	3	N	3	3	X	X	3	N	N	N	N	3	N	N	5	
#22	5	0017	3E	5	3	X	X	N	N	N	N	N	N	N	N	X	X	X	X	X	N	N	N	N	N	N	N	7	
	6	S002	3E	5	5	N	X	N	N	N	N	3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	1	7	
	6	S001	3E	7	7	N	X	N	N	N	7	N	7	7	N	6	6	6	6	N	N	N	N	N	N	N	N	7	
	6	Y001	3E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	7	

APPENDIX C

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

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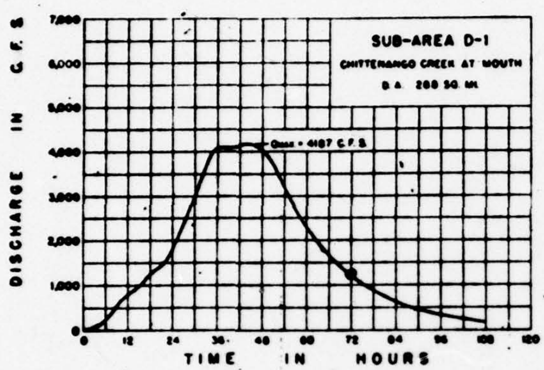
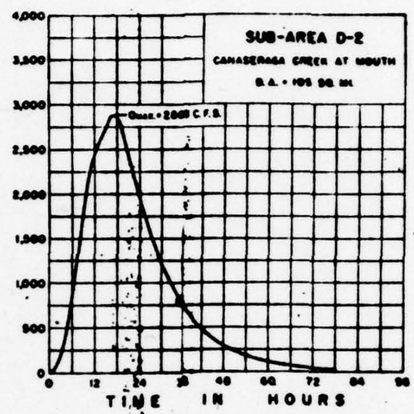
PROJECT NAME NEW YORK STATE DAM INSPECTION DATE 6.1.79

SUBJECT DERUYTER DAM PROJECT NO. 2305

PARAMETER COMPUTATIONS * SHEET 1 OF 2 DRAWN BY JPG





USE CANASERAGA CREEK FOR COMPUTATION OF:
$R/(T_c+R)$, C_t & C_p.

For observed events, T_c and R can be estimated from measurable characteristics of a hydrograph, as follows:

(1) T_c can be estimated as the time from the end of a burst of rainfall excess to the inflection point on the recession limb of the resulting direct runoff hydrograph.

(2) R can be estimated as the discharge at the inflection point on the recession limb of the direct runoff hydrograph divided by the slope of the recession limb at that point.

$R = 750/(650/18) = 20.77$ $\qquad T_c = 36$

$$\frac{R}{T_c + R} = \frac{20.77}{56.77} = .366$$

* COMPUTER & RELATED STUDIES FOR LAKE LEVEL CONTROL & RIVER REGULATION; REPORT TO US ARMY CORPS OF ENGINEERS, BUFFALO DISTRICT; NYS DEPT OF ENVIRONMENTAL CONSERVATION NOV 1/77; (UNIT HYDROGRAPHS BY BUFFALO DISTRICT)

* TRAINING COURSE ON HYDROLOGIC & HYDRAULIC ASPECTS OF NON-FEDERAL DAM SAFETY PHASE I INSPECTION & REPORTING (HHANDS) 24-28 JULY 1978

PROJECT NAME: NEW YORK STATE DAM INSPECTION — DATE: 6·1·79

SUBJECT: DE RUYTER DAM — PROJECT NO. 2305

PARAMETER COMPUTATIONS — SHEET 2 OF 2 — DRAWN BY: JPG

$$C_t = \frac{(t_{pR} - .25\, t_R)}{.955\,(L \times L_{ca})^{.3}} = \frac{18 - .25(1)}{.955\,(23 \times 12)^{.3}} = \frac{17.75}{5.16} = 3.44$$

$$640\, C_p = \frac{Q_{pR} \times t_{pR}}{A} = \frac{2886 \times 18}{105} = 495$$

$$C_p = 495/640 = .77$$

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PROJECT NAME New York State Dam Inspection DATE 6·19·79

SUBJECT De Ruyter Dam PROJECT NO. 2305

Estimate of Clark's Parameters DRAWN BY JPG

$R/(T_c+R) = 0.366$

Estimate of T_c

$T_c = 11.9\,(L^3/H)^{.385}$

	L (MI)	H (FT)	T_c	R
Sub Area 1	1.89	550	2.79	1.61
" " 2	0.95	405	1.11	0.64
" " 3	1.82	545	2.10	1.21
" " 4	1.82	725	1.88	1.09

$(.634R = .366T_c)$

SCS

$$L = \frac{l^{.8}(S+1)^{.7}}{1900Y^{.2}} \qquad S = \frac{1000}{CN} - 10 \qquad T_c = L/.6$$

	l (FT)	S	Y (%)	L	T_c	R
Sub Area 1	9980	3.89	10	.80	1.33	.77
" " 2	5016	3.89	25	.29	.49	.28
" " 3	9610	3.89	25	.49	.82	.47
" " 4	9610	3.89	15	.63	1.06	.61

PROJECT NAME NEW YORK STATE DAM INSPECTION DATE 6.21.79

SUBJECT DE RUYTER DAM PROJECT NO. 2305

ESTIMATE OF SNYDER'S PARAMETERS DRAWN BY JPG

640 C_p -

$C_p = .77$ FOR SUB AREA 1 THRU 4

$t_p = C_t\,(L \times L_{ca})^{.3}$

	C_t	L	L_{ca}	t_p
SUB AREA 1	3.44	1.89	1.23	4.43
" " 2	3.44	0.95	0.57	2.86
" " 3	3.44	1.82	0.95	4.05
" " 4	3.44	1.82	1.14	4.28

$t_r = t_p/5.5$

	t_p	t_r
SUB AREA 1	4.43	0.80
" " 2	2.86	0.52
" " 3	4.05	0.74
" " 4	4.28	0.78

$t_{pr} = t_p + .25\,(t_R - t_r)$

	t_p	t_R	t_r	t_{pr}
SUB AREA 1	4.43	1.0	0.80	4.48
" " 2	2.86	1.0	0.52	2.98
" " 3	4.05	1.0	0.74	4.12
" " 4	4.28	1.0	0.78	4.34

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PROJECT NAME NEW YORK STATE DAM INSPECTION DATE 6·1·79
SUBJECT DE RUYTER DAM PROJECT NO. 2305
DEPTH - DURATION RELATIONSHIP DRAWN BY JPG

HYDROMETEOROLOGICAL REPORT No 33

PMP INDEX RAINFALL
200 SQ MI
24 HR - 20"

DURATION	%	DEPTH
6	103	20.6"
12	116	23.2"
24	126	25.2"
48	138	27.6"

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PROJECT NAME New York State Dam Inspection DATE 7.10.79

SUBJECT De Ruyter Dam PROJECT NO. 2305

Stage - Discharge Relationship DRAWN BY JPG

Assume Orifice Flow

Stage	C	A	2g	H	$\sqrt{2gH}$	Q (1 pipe)	Q (3 pipes)
1219	.35	.785	64.4	0	0	0	0
1220	↓	↓	↓	1	8.02	.27	0.81
1225				6	19.66	5.40	16.20
1230				11	26.62	7.31	21.93
1235				16	32.10	8.82	26.46
1240				21	36.77	10.10	30.30
1245				26	40.92	11.24	33.72
1250				31	44.68	12.28	36.84
1255				36	48.15	13.23	39.69
1260				41	51.38	14.12	42.36
1265				46	54.43	14.95	44.85
1270				51	57.31	15.75	47.25
1275				56	60.05	16.49	49.47
1280				61	62.68	17.22	51.66
1285				66	65.20	17.91	53.73
1290	.35	.785	64.4	71	67.62	18.58	55.74

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PROJECT NAME NEW YORK STATE DAM INSPECTION DATE 6-6-79

SUBJECT DE RUYTER DAM PROJECT NO. 2305

OVERFLOW DISCHARGE CALCULATIONS DRAWN BY AMS

SUMMARY

LAKE ELEVATION (FT)	HEIGHT ABOVE SPILLWAY ELEV. (FT.)	NET DISCHARGE (CFS)
1280	0	0
1281	1	69
1282	2	180
1283	3	277
1284	4	377
1285	5	485
1286	6	580
1287	7	668
1288	8	1170
1289	9	4,750
1290	10	10,120

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PROJECT NAME: NEW YORK STATE DAM INSPECTION — DATE: 6-6-79

SUBJECT: DE RUYTER DAM — PROJECT NO. 2305

OVERFLOW DISCHARGE CALCULATIONS — DRAWN BY: AMS

water surface = 1280', $h=0$, $Q=0$ cfs — $h=0$, $Q=0$

water surface = 1281' $h=1'$

$Q = CLH^{3/2}$ $C \cong 1.72$

$= 1.72 \times 40' \times 1^{3/2} = 69$ cfs

checking depth through culvert

$Q = VA = \frac{1.49}{n} A \cdot R^{2/3} S^{1/2}$ $S = .002$ $S^{1/2} = .045$, $n = .013$

$69 = {}^{1.49}/_{.013}\, A R^{2/3}\, .045$

$AR^{2/3} = 13.34$ — $h=1$, $Q=69$ cfs

$d \cong 1.1' \pm$ weir not submerged, open channel flow in culvert

water surface = 1282' $h=2'$

$Q = CLH^{3/2}$ $C \cong 1.72$

$= 1.72 \times 40' \times 2^{3/2} = 195$ cfs

checking depth through culvert

$Q = {}^{1.49}/_{n}\, A \cdot R^{2/3} S^{1/2} = 195$

$AR^{2/3} = 37.8$

$d \cong 2.2' \pm$ weir not submerged, open channel flow in culvert

checking inlet control on culvert (see nomograph)

for $Q/\text{span} = 195/12' = 16.25 \Rightarrow HW/Ri \cong .68 \pm$

$\Rightarrow HW = 3.4' > 3.04'$ weir is submerged

revise calculations to account for submerged weir

$Q = CL\sqrt{h'}\,(h + .381 d)$ $C = 1.72$, let $h = 1.79$, $d = .21$

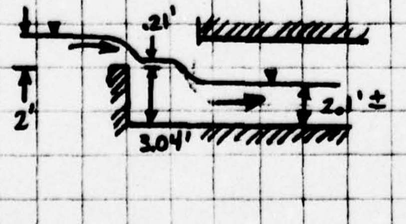
$= 1.72\,(40)\sqrt{2}\,(1.79 + .381(.21)) = 182$ cfs

checking inlet control on culvert

$Q/Sp = 182/12 = 15.2 \Rightarrow HW/Ri = .66 \Rightarrow HW \cong 5 \times .66 = 3.3 \pm$

since $.21 + 3.04 = 3.25'$ (depth below weir) $\cong 3.3$ (headwater depth) — $h = 2'$

✓OK assume Q a little less or 180 cfs — $Q = 180$ cfs



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DESIGN BRIEF

PROJECT NAME NEW YORK STATE DAM INSPECTION DATE 6-6-79
SUBJECT DE RUYTER DAM PROJECT NO. 2305
OVERFLOW DISCHARGE CALCULATIONS DRAWN BY AMS

water surface = 1283 $h = 3'$

assume weir submerged

$Q = CL\sqrt{h'}\,(h + .381d)$ $C = 1.79$, let $h = 1.75'$, $d = 1.25'$

$= 1.79 \times 40 \times \sqrt{3}\,\left[1.75 + .381(1.25)\right] = 277$ cfs

checking inlet control on culvert

$Q/S_p = 277/12 = 23. \Rightarrow HW/R_i \cong .86 \Rightarrow HW = .86 \times 5 = 4.3$

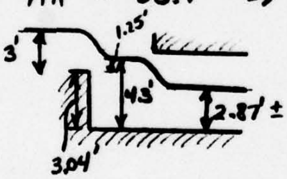
since 4.3 (headwater depth) $\cong$ 3.04 + 1.25 = 4.29' (depth below weir)

✓ok

checking depth of flow in culvert:

$Q = 277 = \frac{1.49}{n} A R^{2/3} S^{1/2}$

$AR^{2/3} = 53.7 \Rightarrow$ depth flow = 2.87' ± < 4.3' ✓ inlet control



water surface = 1284', $h = 4'$

$Q = CL\sqrt{h'}\,(h + .381d)$ $C = 1.85$; let $h = 1.65$, $d = 2.35$

$= 1.85 \times 40 \times \sqrt{4'}\,\left[1.65 + .381(2.35)\right] = 377$ cfs

checking inlet control on culvert

$Q/S_p = 377/12 = 31.5 \Rightarrow HW/R_i \cong 1.085$

$\therefore HW = 5 \times 1.085 = 5.42 \pm$

since 5.42' (headwater depth) $\cong$ 2.35 + 3.04 = 5.39' (depth below weir)

✓ok

$h = 3'$
$Q = 277$ cfs

$h = 4'$
$Q = 377$ cfs

PROJECT NAME: NEW YORK STATE DAM INSPECTION — DATE: 6-6-79

SUBJECT: DE RUYTER DAM — PROJECT NO. 2305

OVERFLOW DISCHARGE CALCULATIONS — DRAWN BY: AMS

water surface = 1285' $h = 5'$

$Q = CL\sqrt{h}\,(h + .381\,d)$ $C = 1.85$ let $h = 1.65'$ $d = 3.35'$

$= 1.85 \times 40\sqrt{5}\,[1.65 + .381(3.35)] = 485$ cfs

checking inlet control on culvert

$Q/sp = 485/12 = 40.4 \Rightarrow HW/R_i \cong 1.275 \pm \Rightarrow HW = 5 \times 1.275 = 6.38'$

since 6.38 (headwater depth) $\cong$ 3.35 + 3.04 = 6.39' (depth below weir)

✓OK

h = 5'
Q = 485 cfs

water surface = 1286 $h = 6'$

$Q = CL\sqrt{h}\,(h + .381\,d)$ $C = 1.85$ let $h = 1.5'$ $d = 4.5'$

$= 1.85 \; 40\sqrt{6}\,[1.5 + .381(4.5)] = 580$ cfs

checking inlet control on culvert

$Q/sp = 580/12 = 48.5 \Rightarrow HW/R_i = 1.5$ $HW = 1.5 \times 5 = 7.5$

since 7.5' (headwater depth) $\cong$ 4.5 + 3.04 = 7.54' (depth below weir)

✓OK

h = 6'
Q = 580 cfs

water surface = 1287' $h = 7'$

$Q = CL\sqrt{h}\,(h + .381\,d)$ $C = 1.85$ let $h = 1.20$ $d = 5.80$

$= 1.85 \times 40\sqrt{7}\,[1.2 + .381(5.8)] = 668$ cfs

checking inlet control on culvert

$Q/sp = 668/12 = 55.6 \Rightarrow HW/R_i = 1.78$ $HW = 1.78 \times 5 = 8.9'$

since 8.9' (headwater depth) $\cong$ 5.8 + 3.04 = 5.84 (depth below weir)

✓OK

h = 7'
Q = 668 cfs

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501 TEL 315-797-5800 **DESIGN BRIEF**

PROJECT NAME: NEW YORK STATE DAM INSPECTION — DATE: 6-6-79

SUBJECT: DE RUYTER DAM — PROJECT NO. 2305

OVERFLOW DISCHARGE CALCULATIONS — DRAWN BY: AMS

water surface = 1288 $h = 8'$ (dam overtopped by 0.3')

flow through culvert

let $HW = 8' + 3.04' - 1.04' = 10'$ $HW/R_i = 10/5 = 2$

$\Rightarrow Q/S_p \cong 61.5$ or $Q_c = 61.5 \times 12 = 738$ cfs

flow overtopping embankment

$Q_{WE} = CLH^{3/2}$ $H = .3'$, $L \cong 1600' \pm$,

$1.44\ (\#20) < C < 1.70\ (\#46)$ let $C = 1.65$

$= 1.65 \times 1600 \times .3^{3/2} = 434$ cfs $h = 8'$

total flow $= Q_c + Q_{WE} = 738 + 434 = 1172$ cfs $Q = 1170$ cfs

water surface = 1289 $h = 9'$ (overtopping by 1.3')

culvert flow ; let $HW = 9 + 3. - .5 = 11.5$ $HW/R_i = 11.5/5 = 2.3$

$\Rightarrow Q/S_p \cong 70 \therefore Q = 70 \times 12 = 840$ cfs

flow overtopping embankment

$Q = CLH^{3/2} = 1.65\ (1600)\ 1.3^{3/2} = 3913$ cfs $h = 9'$

total flow $= Q_c + Q_E = 840 + 3910 = 4750$ cfs $Q = 4750$ cfs

water surface = 1290 $h = 10'$ (overtopping by 2.3')

culvert flow ; let $HW = 10 + 3 = 13$ $HW/R_i = 13/5 = 2.6$

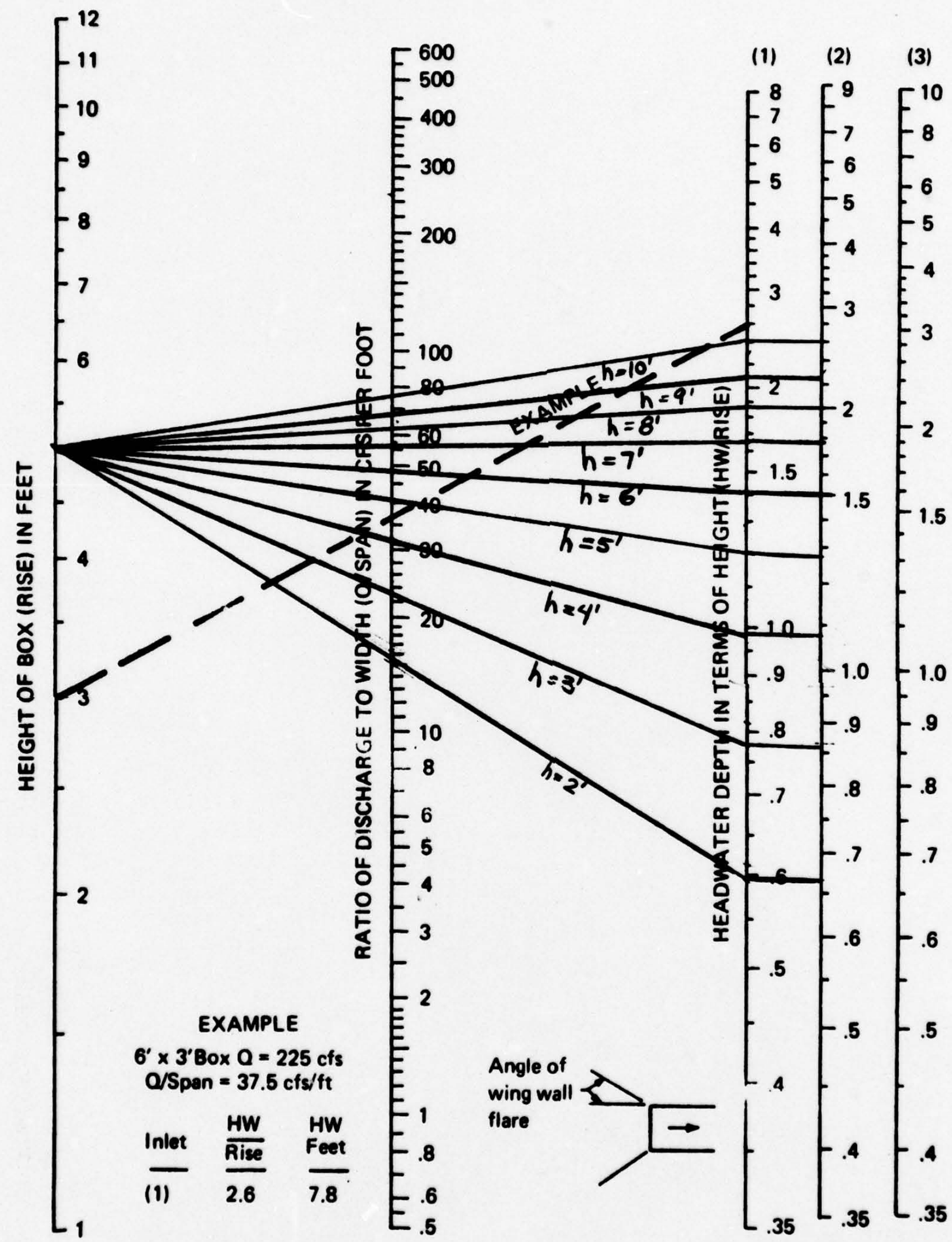
$\Rightarrow Q/S_p = 76$ $Q_c = 76 \times 12 = 912$ cfs

flow overtopping embankment

$Q_E = CLH^{3/2} = 1.65\ (1600)\ 2.3^{3/2} = 9209$ cfs $h = 10'$

total flow $= Q_c + Q_E = 910 + 9210 = 10,120$ cfs $Q = 10,120$ cfs

FIGURE 3: Headwater Depth for Concrete Box Culverts With Inlet Control



HW/Rise SCALE	WING WALL FLARE
(1)	30° to 75°
(2)	90° and 15°
(3)	0° (extensions of sides)

To use scale (2) or (3) project horizontally to scale (1), then use straight inclined line through rise and Q scales, or reverse as illustrated.

BUREAU OF PUBLIC ROADS - JAN 1963

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DESIGN BRIEF

PROJECT NAME New York State Dam Inspection DATE 7.3.79

SUBJECT De Ruyter Dam PROJECT NO. 2305

Stage - Storage DRAWN BY JPG

Calculated by Conic Method described in Flood Hydrograph Package (HEC-1) Sept 78

Reservoir Storage Capacity

$\Delta V = h/3 \left(A_1 + A_2 + \sqrt{A_1 A_2}\right)$

$A_1 = 1.0$ (assumed)

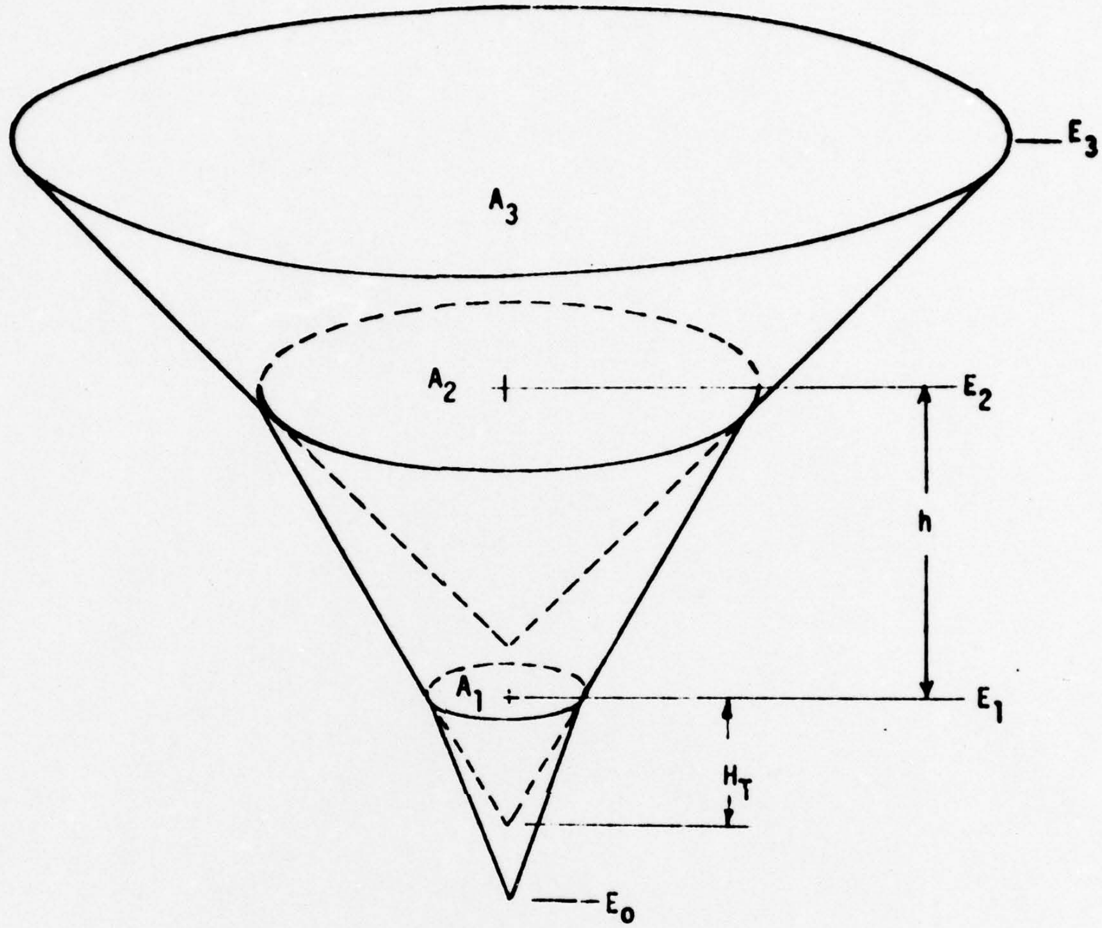
$A_2 = 560.15$

$h = 61'$

$\Delta V = 61/3 \left(1.0 + 560.15 + \sqrt{(1)(560.15)}\right)$

$= 20.33\ (561.15 + 23.66)$

$\Delta V = 11890.00$ Acre - Ft



$$\Delta V_{12} = \frac{h}{3}(A_1 + A_2 + \sqrt{A_1 A_2})$$

$$H_T = h/(\sqrt{A_2/A_1} - 1)$$

Where

ΔV_{12} = volume between base areas 1 and 2,

Ai = surface area of base i,

E_i = elevation of base i,

h = vertical distance (E_2-E_1) between bases A_1 and A_2, and

H_T = height of truncated part of cone.

FIGURE 2: CONIC METHOD FOR RESERVOIR VOLUME

STETSON • DALE BANKERS TRUST BUILDING UTICA • NEW YORK • 13501 TEL 315-797-5800 **DESIGN BRIEF**

PROJECT NAME: New York State Dam Inspection DATE: 7.3.79

SUBJECT: De Ruyter Dam PROJECT NO. 2305

Stage - Storage DRAWN BY:

Assume: Area is proportional to elevation
Volume by Conic Method (HEC-1)

Elev	Area	Volume	
1280 (Spillway)	560.15	$61/3\ (1.0 + 560.15 + \sqrt{(1)(560.15)})$	= 11890
1275	514.23	$56/3\ (1.0 + 514.23 + \sqrt{514.23})$	= 10041
1270	468.32	$51/3\ (1.0 + 468.32 + \sqrt{468.32})$	= 8346
1265	422.41	$46/3\ (1.0 + 422.41 + \sqrt{422.41})$	= 6807
1260	376.49	$41/3\ (1.0 + 376.49 + \sqrt{376.49})$	= 5424
1255	330.58	$36/3\ (1.0 + 330.58 + \sqrt{330.58})$	= 4197
1250	284.67	$31/3\ (1.0 + 284.67 + \sqrt{284.67})$	= 3126
1245	238.75	$26/3\ (1.0 + 238.75 + \sqrt{238.75})$	= 2212
1240	192.84	$21/3\ (1.0 + 192.84 + \sqrt{192.84})$	= 1454
1235	146.92	$16/3\ (1.0 + 146.92 + \sqrt{146.92})$	= 853
1230	101.01	$11/3\ (1.0 + 101.01 + \sqrt{101.01})$	= 410
1225	55.09	$6/3\ (1.0 + 55.09 + \sqrt{55.09})$	= 127
1220	9.18	$1/3\ (1.0 + 9.18 + \sqrt{9.18})$	= 4
1219 (Bottom of Dam)	1.0 (Assumed)	1.0	= 1

```
DAMBRK,P30,T5,CM300000.
ACCOUNT,C0746,STET.
SYSCALL,HEC1DAM/NOECHO.
REWIND,OUTPUT.
COPYEI,OUTPUT,RUOUT.
REPLACE,RUOUT.
REWIND,OUTPUT.
GOTO,DAYFILE.
EXIT.
DAYFILE,DAY.
REPLACE,DAY.
/EOR
A1       DE RUYTER DAM
A2       HEC-1DB
A3       PMF-RUNOFF ANALYSIS (CLARK'S PARAMETERS)   W/ LOW LEVEL OUTLET
B      90       1       0       0       0       0       0       0       4
B1      5
J       1       6       1
J1     .2      .4      .5      .6      .8     1.0
K       0       1       0       0       0       0       1
K1   SUB AREA 1 RUNOFF
M       1       0    1.37       0     5.6       0       0       0       1
P       0    20.5     111     123     133     142
T       0       0       0       0       0       0       1     0.1
V    1.33    0.77
X       2       2       1
K       1      10       0       0       0       0       1
K1   CHANNEL ROUTE THRU SUB AREA 2
Y       0       0       0       1       1
Y1      1       0       0       0       0       0      -1
Y6    .08     .04     .08    1275    1320    4300    .007
Y7    100    1320     200    1300     280    1280     290    1275     300    1275
Y7    310    1280     400    1300     450    1320
K       0       2       0       0       0       0       1
K1   SUB AREA 2 RUNOFF
M       1       0    1.29       0     5.6       0       0       0       1
P       0    20.5     111     123     133     142
T       0       0       0       0       0       0       1     0.1
V     .49     .28
X       2       2       1
K       2      10       0       0       0       0       1
K1   COMBINE 2 HYDROGRAPHS AT 10
K       0       3       0       0       0       0       1
K1   SUB AREA 3 RUNOFF
M       1       0    2.94       0     5.6       0       0       0       1
P       0    20.5     111     123     133     142
T       0       0       0       0       0       0       1     0.1
V     .82     .47
X       6       6       1
K       2      20       0       0       0       0       1
K1   COMBINE 2 HYDROGRAPHS AT 20  (10 AND 20 SAME ON LAKE)
K       1      20       0       0       0       0       1
K1   ROUTE THRU  DE RUYTER DAM
Y       0       0       0       1       1
Y1      1       0       0       0       0       0   -1280      -1
Y4   1219    1220    1225    1230    1235    1240    1245    1250    1255    1260
Y4   1265    1270    1275    1280    1285    1290
Y5      0     .80    16.2   21.93   26.46   30.30   33.72   36.84   39.49   42.36
Y5  44.85   47.25   49.47   51.66   539.0     965
$S      1       4     127     410     853    1454    2212    3126    4197    5424
$S   6807    8346   10041   11890   14690   17490
$E   1219    1220    1225    1230    1235    1240    1245    1250    1255    1260
$E   1265    1270    1275    1280    1285    1290
$$   1280
$D1287.7    2.64     1.5  1560.0
```

```
00730 K      1     30      0      0      0      0      1
00740 K1   CHANNEL ROUTE THRU SUB AREA 4
00750 Y      0      0      0      1      1
00760 Y1     1      0      0      0      0      0     -1
00770 Y6   .08    .04    .08   1165   1200  10200   .001
00780 Y7   100   1200    200   1180    400   1170    403   1165    407   1165
00790 Y7   410   1170    480   1180    620   1200
00800 K      0      4      0      0      0      0      1
00810 K1   SUB AREA 4 RUNOFF
00820 M      1      0   2.19      0    5.6      0      0      0      1
00830 P      0   20.5    111    123    133    142
00840 T      0      0      0      0      0      0      1    0.1
00850 V   1.06    .61
00860 X      4      4      1
00870 K      2     30      0      0      0      0      1
00880 K1   COMBINE 2 HYDROGRAPHS AT 30
00890 K      1     30      0      0      0      0      1
00900 K1   ROUTE THRU DOWNSTREAM HAZARD
00910 Y      0      0      0      1      1
00920 Y1     1      0      0      0      0      0     -1
00930 Y6   .08    .04    .08   1070   1100   8000   .001
00940 Y7   100   1100    450   1080    850   1070    855   1065    865   1065
00950 Y7   900   1070   1000   1080   1100   1100
00970 K     99
00980 A
00990 A
01000 A
01010 A
01020 A
01030 /EOF
0
```

```
RUOUT      10:38 JUL 18,'79

1********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 ********************************
1                               PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                        RUNOFF HYDROGRAPH AT           1
                                        ROUTE HYDROGRAPH TO           10
                                        RUNOFF HYDROGRAPH AT           2
                                        COMBINE  2 HYDROGRAPHS AT     10
                                        RUNOFF HYDROGRAPH AT           3
                                        COMBINE  2 HYDROGRAPHS AT     20
                                        ROUTE HYDROGRAPH TO           20
                                        ROUTE HYDROGRAPH TO           30
                                        RUNOFF HYDROGRAPH AT           4
                                        COMBINE  2 HYDROGRAPHS AT     30
                                        ROUTE HYDROGRAPH TO           30
                                        END OF NETWORK


1********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 ********************************

 RUN  DATE# 79/07/18.
      TIME# 08.42.31.


                            DE RUYTER DAM
                            HEC-1DB
                            PMF-RUNOFF ANALYSIS (CLARK'S PARAMETERS)   W/ LOW LEVEL OUTLET

                                              JOB SPECIFICATION
                  NQ     NHR    NMIN    IDAY     IHR    IMIN   METRC    IPLT    IPRT   NSTAN
                  90       1       0       0       0       0       0       0       4       0
                                         JOPER     NWT   LROPT   TRACE
                                             5       0       0       0

                                          MULTI-PLAN ANALYSES TO BE PERFORMED
                                              NPLAN= 1 NRTIO= 6 LRTIO= 1
                     RTIOS=    .20    .40    .50    .60    .80   1.00


          **********        **********        **********        **********        **********

                                          SUB-AREA RUNOFF COMPUTATION

                  SUB AREA 1 RUNOFF

                              ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                  1       0       0       0       0       0       1       0       0

                                                 HYDROGRAPH DATA
                 IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                     1       0    1.37    0.00    5.60    0.00   0.000       0       1       0

                                                   PRECIP DATA
```

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	20.50	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA

TC= 1.33 R= .77 NTA= 0

RECESSION DATA

STRTQ= 2.00 QRCSN= 2.00 RTIOR= 1.00

UNIT HYDROGRAPH 5 END-OF-PERIOD ORDINATES, LAG= 1.03 HOURS, CP= .57 VOL= 1.00

287. 409. 148. 31. 7.

0

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	23.29	19.60	3.69	17461.
										(592.)	(498.)	(94.)	(494.44)

********* ********* ********* ********* *********

HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUB AREA 2

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
10	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0400	.0800	1275.0	1320.0	4300.	.00700

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC

100.00 1320.00 200.00 1300.00 280.00 1280.00 290.00 1275.00 300.00 1275.00
310.00 1280.00 400.00 1300.00 450.00 1320.00

STORAGE	0.00	3.45	9.11	17.97	31.52	49.77	72.74	100.41	132.79	169.87
	211.66	258.11	308.79	363.62	422.61	485.75	553.05	624.49	700.09	779.84
OUTFLOW	0.00	154.64	592.40	1524.95	2953.78	4938.73	7547.22	10842.79	14886.10	19735.46
	25447.13	32121.41	39811.74	48495.26	58208.67	68989.44	80875.30	93903.98	108113.00	123539.66
STAGE	1275.00	1277.37	1279.74	1282.11	1284.47	1286.84	1289.21	1291.58	1293.95	1296.32
	1298.68	1301.05	1303.42	1305.79	1308.16	1310.53	1312.89	1315.26	1317.63	1320.00
FLOW	0.00	154.64	592.40	1524.95	2953.78	4938.73	7547.22	10842.79	14886.10	19735.46

```
        25447.13   32121.41   39811.74   48495.26   58208.67   68989.44   80875.30   93903.98  108113.00  123539.66

MAXIMUM STAGE IS    1280.3

MAXIMUM STAGE IS    1282.2

MAXIMUM STAGE IS    1282.9

MAXIMUM STAGE IS    1283.6

MAXIMUM STAGE IS    1284.8

MAXIMUM STAGE IS    1285.7


          **********        **********        **********        **********        **********

                                         SUB-AREA RUNOFF COMPUTATION

                  SUB AREA 2 RUNOFF

                                ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                    2       0       0       0       0       0       1       0       0

                                              HYDROGRAPH DATA
                  IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
                      1       0    1.29    0.00    5.60    0.00   0.000       0       1       0

                                               PRECIP DATA
                           SPFE     PMS      R6     R12     R24     R48     R72     R96
                           0.00   20.50  111.00  123.00  133.00  142.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS  .800

                                                LOSS DATA
             LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
                 0    0.00    0.00    1.00    0.00    0.00    1.00    1.00     .10    0.00    0.00

                                            UNIT HYDROGRAPH DATA
                                      TC=    .49    R=    .28    NTA=  0

                                              RECESSION DATA
                                 STRTQ=     2.00    QRCSN=     2.00    RTIOR= 1.00

                UNIT HYDROGRAPH  2 END-OF-PERIOD ORDINATES, LAG=     .79 HOURS, CP=  .50  VOL= 1.00
             416.      416.

         0                                    END-OF-PERIOD FLOW
     MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q      MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                              SUM  23.29  19.60   3.69   16491.
                                                                                 ( 592.)( 498.)(  94.)( 466.97)


          **********        **********        **********        **********        **********

                                            COMBINE HYDROGRAPHS

                  COMBINE 2 HYDROGRAPHS AT 10

                                ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                                   10       2       0       0       0       0       1       0       0
```

```
**********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

          SUB AREA 3 RUNOFF

                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                         3       0       0       0       0       0       1       0       0

                                   HYDROGRAPH DATA
           IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
               1       0    2.94    0.00    5.60    0.00   0.000       0       1       0

                                     PRECIP DATA
                      SPFE     PMS      R6     R12     R24     R48     R72     R96
                      0.00   20.50  111.00  123.00  133.00  142.00    0.00    0.00
TRSPC COMPUTED BY THE PROGRAM IS  .800

                                      LOSS DATA
        LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
            0    0.00    0.00    1.00    0.00    0.00    1.00    1.00     .10    0.00    0.00

                                 UNIT HYDROGRAPH DATA
                           TC=    .82     R=    .47    NTA=  0

                                   RECESSION DATA
                      STRTQ=     6.00    QRCSN=     6.00    RTIOR= 1.00

          UNIT HYDROGRAPH  2 END-OF-PERIOD ORDINATES, LAG=     .79 HOURS, CP=  .50  VOL= 1.00
       948.      948.

     0                                END-OF-PERIOD FLOW
 MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q       MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q

                                                                       SUM  23.29  19.60   3.69   37765.
                                                                          ( 592.)( 498.)(  94.)( 1067.69)


**********          **********          **********          **********          **********

                                 COMBINE HYDROGRAPHS

          COMBINE 2 HYDROGRAPHS AT 20  (10 AND 20 SAME ON LAKE)

                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                        20       2       0       0       0       0       1       0       0


**********          **********          **********          **********          **********

                                 HYDROGRAPH ROUTING

          ROUTE THRU  DE RUYTER DAM

                     ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                        20       1       0       0       0       0       1       0       0
                                     ROUTING DATA
               QLOSS   CLOSS     AVG    IRES   ISAME    IOPT    IPMP            LSTR
                 0.0   0.000    0.00       1       1       0       0               0

                     NSTPS   NSTDL     LAG   AMSKK       X     TSK   STORA  ISPRAT
                         1       0       0   0.000   0.000   0.000  -1280.      -1
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STAGE	1219.00	1220.00	1225.00	1230.00	1235.00	1240.00	1245.00	1250.00	1255.00	1260.00
	1265.00	1270.00	1275.00	1280.00	1285.00	1290.00				
FLOW	0.00	.80	16.20	21.93	26.46	30.30	33.72	36.84	39.49	42.36
	44.85	47.25	49.47	51.66	539.00	965.00				

CAPACITY=	1.	4.	127.	410.	853.	1454.	2212.	3126.	4197.	5424.
	6807.	8346.	10041.	11890.	14690.	17490.				
ELEVATION=	1219.	1220.	1225.	1230.	1235.	1240.	1245.	1250.	1255.	1260.
	1265.	1270.	1275.	1280.	1285.	1290.				

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1280.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1287.7	2.6	1.5	1560.

PEAK OUTFLOW IS 212. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 401. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 496. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 584. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 749. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 4741. AT TIME 43.00 HOURS

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HYDROGRAPH ROUTING

CHANNEL ROUTE THRU SUB AREA 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0400	.0800	1165.0	1200.0	10200.	.00100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1200.00 200.00 1180.00 400.00 1170.00 403.00 1165.00 407.00 1165.00
410.00 1170.00 480.00 1180.00 620.00 1200.00

STORAGE	0.00	2.20	5.36	10.30	31.47	74.10	138.18	223.71	330.69	454.75
	588.47	731.72	884.51	1046.83	1218.69	1400.08	1591.01	1791.47	2001.47	2221.01
OUTFLOW	0.00	12.04	40.13	89.91	216.57	493.85	983.64	1738.83	2807.16	4358.10
	6279.51	8550.38	11175.61	14162.01	17517.63	21251.31	25372.41	29890.64	34815.94	40158.41
STAGE	1165.00	1166.84	1168.68	1170.53	1172.37	1174.21	1176.05	1177.89	1179.74	1181.58
	1183.42	1185.26	1187.11	1188.95	1190.79	1192.63	1194.47	1196.32	1198.16	1200.00
FLOW	0.00	12.04	40.13	89.91	216.57	493.85	983.64	1738.83	2807.18	4358.10
	6279.51	8550.38	11175.61	14162.01	17517.63	21251.31	25372.41	29890.64	34815.94	40158.41

MAXIMUM STAGE IS 1172.2

MAXIMUM STAGE IS 1173.5

MAXIMUM STAGE IS 1174.1

MAXIMUM STAGE IS 1174.5

MAXIMUM STAGE IS 1175.1

MAXIMUM STAGE IS 1180.5

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SUB-AREA RUNOFF COMPUTATION

SUB AREA 4 RUNOFF

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	0	2.19	0.00	5.60	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	20.50	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	0.00

UNIT HYDROGRAPH DATA
TC= 1.06 R= .61 NTA= 0

RECESSION DATA
STRTQ= 4.00 QRCSN= 4.00 RTIOR= 1.00

UNIT HYDROGRAPH 4 END-OF-PERIOD ORDINATES, LAG= .85 HOURS, CP= .52 VOL= 1.00
624. 698. 81. 8.

0 END-OF-PERIOD FLOW
MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q MO.DA HR.MN PERIOD RAIN EXCS LOSS COMP Q

SUM 23.29 19.60 3.69 28026.

(592.)(498.)(94.)(793.61)

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COMBINE HYDROGRAPHS

COMBINE 2 HYDROGRAPHS AT 30

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTE THRU DOWNSTREAM HAZARD

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
30	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	1	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	-1.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.0800	.0400	.0800	1070.0	1100.0	8000.	.00100

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
100.00 1100.00 450.00 1080.00 850.00 1070.00 855.00 1065.00 865.00 1065.00
900.00 1070.00 1000.00 1080.00 1100.00 1100.00

STORAGE	0.00	53.49	102.33	174.07	268.69	386.21	526.62	687.13	858.64	1040.45
	1232.56	1434.97	1647.69	1870.71	2104.03	2347.65	2601.58	2865.80	3140.33	3425.16
OUTFLOW	0.00	751.86	1379.52	2313.63	3616.83	5345.71	7552.81	10443.77	13929.56	17926.14
	22437.77	27471.39	33035.59	39140.13	45795.52	53012.82	60803.44	69179.08	78151.58	87732.90
STAGE	1070.00	1071.58	1073.16	1074.74	1076.32	1077.89	1079.47	1081.05	1082.63	1084.21
	1085.79	1087.37	1088.95	1090.53	1092.11	1093.68	1095.26	1096.84	1098.42	1100.00
FLOW	0.00	751.86	1379.52	2313.63	3616.83	5345.71	7552.81	10443.77	13929.56	17926.14
	22437.77	27471.39	33035.59	39140.13	45795.52	53012.82	60803.44	69179.08	78151.58	87732.90

MAXIMUM STAGE IS 1072.8

MAXIMUM STAGE IS 1074.9

MAXIMUM STAGE IS 1075.6

MAXIMUM STAGE IS 1076.3

MAXIMUM STAGE IS 1077.5

MAXIMUM STAGE IS 1078.5

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

				RATIOS APPLIED TO FLOWS					
OPERATION	STATION	AREA	PLAN	RATIO 1	RATIO 2	RATIO 3	RATIO 4	RATIO 5	RATIO 6
				.20	.40	.50	.60	.80	1.00
HYDROGRAPH AT	1	1.37	1	792.	1583.	1979.	2375.	3167.	3958.
		(3.55)		(22.42)	(44.84)	(56.05)	(67.25)	(89.67)	(112.09)
ROUTED TO	10	1.37	1	812.	1605.	2010.	2410.	3213.	4016.
		(3.55)		(23.00)	(45.45)	(56.91)	(68.26)	(90.98)	(113.73)
HYDROGRAPH AT	2	1.29	1	787.	1573.	1966.	2360.	3146.	3933.
		(3.34)		(22.27)	(44.54)	(55.68)	(66.82)	(89.09)	(111.36)
2 COMBINED	10	2.66	1	1583.	3148.	3938.	4725.	6299.	7873.
		(6.89)		(44.84)	(89.13)	(111.52)	(133.79)	(178.35)	(222.94)
HYDROGRAPH AT	3	2.94	1	1793.	3586.	4482.	5379.	7171.	8964.
		(7.61)		(50.77)	(101.54)	(126.92)	(152.30)	(203.07)	(253.84)
2 COMBINED	20	5.60	1	3342.	6664.	8334.	10000.	13332.	16665.
		(14.50)		(94.63)	(188.71)	(235.99)	(283.16)	(377.52)	(471.90)
ROUTED TO	20	5.60	1	212.	401.	496.	584.	749.	4741.
		(14.50)		(6.02)	(11.37)	(14.04)	(16.52)	(21.21)	(134.26)
ROUTED TO	30	5.60	1	204.	386.	477.	566.	728.	3463.
		(14.50)		(5.77)	(10.94)	(13.50)	(16.02)	(20.61)	(98.06)
HYDROGRAPH AT	4	2.19	1	1305.	2609.	3261.	3914.	5218.	6523.
		(5.67)		(36.94)	(73.88)	(92.35)	(110.82)	(147.76)	(184.70)
2 COMBINED	30	7.79	1	1411.	2782.	3468.	4157.	5537.	6912.
		(20.18)		(39.94)	(78.76)	(98.21)	(117.72)	(156.78)	(195.74)
ROUTED TO	30	7.79	1	1227.	2418.	3034.	3645.	4909.	6181.
		(20.18)		(34.76)	(68.46)	(85.91)	(103.21)	(139.00)	(175.02)

PLAN 1 STATION 10

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	812.	1280.3	41.00
.40	1605.	1282.2	41.00
.50	2010.	1282.9	41.00
.60	2410.	1283.6	41.00
.80	3213.	1284.8	41.00
1.00	4016.	1285.7	41.00

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1		INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
	ELEVATION	1280.00	1280.00	1287.70
	STORAGE	11890.	11890.	16202.
	OUTFLOW	52.	52.	769.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.20	1281.65	0.00	12814.	212.	0.00	44.00	0.00
.40	1283.59	0.00	13900.	401.	0.00	44.00	0.00
.50	1284.56	0.00	14441.	496.	0.00	44.00	0.00
.60	1285.52	0.00	14983.	584.	0.00	44.00	0.00
.80	1287.47	0.00	16072.	749.	0.00	44.00	0.00
1.00	1288.66	.96	16741.	4741.	7.00	43.00	0.00

PLAN 1 STATION 30

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	204.	1172.2	48.00
.40	386.	1173.5	48.00
.50	477.	1174.1	48.00
.60	566.	1174.5	48.00
.80	728.	1175.1	48.00
1.00	3463.	1180.5	44.00

PLAN 1 STATION 30

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.20	1227.	1072.8	41.00
.40	2418.	1074.9	41.00
.50	3034.	1075.6	41.00
.60	3645.	1076.3	41.00
.80	4909.	1077.5	41.00
1.00	6181.	1078.5	41.00

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
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APPENDIX D

REFERENCES

APPENDIX

REFERENCES

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